1998-03 AUTOMATIC TRANSMISSIONS

Complete Transmissions - ML 320 - 722.662

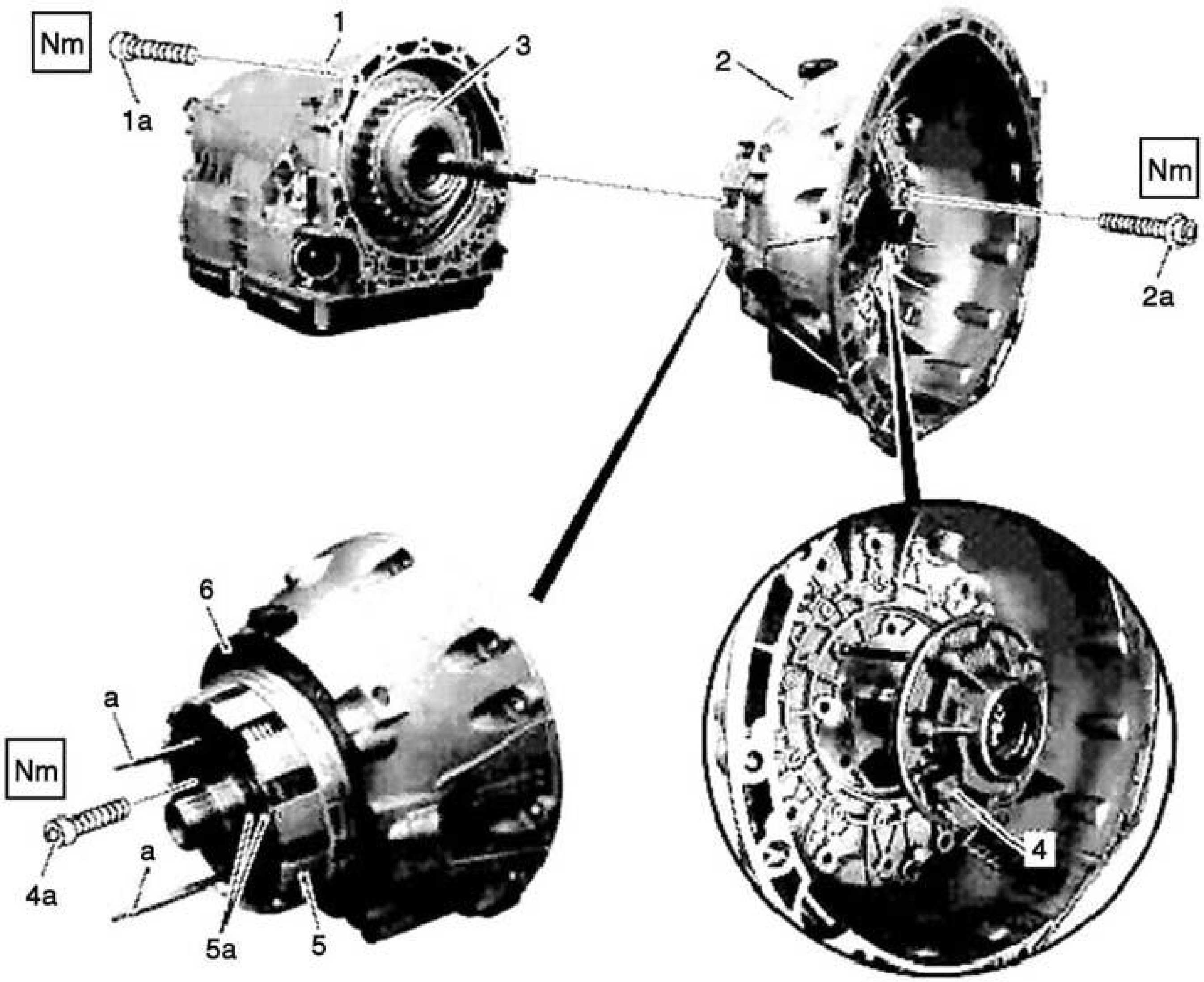
MODEL IDENTIFICATION

MODEL IDENTIFICATION

Model (Year)	Chassis	Engine	Transmission
ML320 (2001-03)	163.154	112.942	722.662

COMPLETE TRANSMISSION

REMOVE/INSTALL OIL PUMP



1	Transmission housing	3	Multi-disk clutch K1	6	Intermediate panel
1a	Internal Torx drive bolts	4a	Internal Torx drive bolts	a	Bolt
2	Torque converter housing	5	Multi-disk brake B1		
2a	Internal Torx drive bolts	5a	Teflon rings		

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Fig. 1: Removing & Installing Oil Pump
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Remove/Install

1 - Remove transmission with torque converter. See **REMOVE/INSTALL TRANSMISSION WITH TORQUE CONVERTER**.

2 - Put transmission down on workbench. See **Fig. 1**.

3 - Take transmission housing (1) off torque converter housing (2). See **Fig. 1**.

NOTE: **Internal Torx drive bolts (2a) 15 bolts and internal Torx drive bolts (1a) 2 bolts.**

NOTE: **The intermediate panel (6) on the torque converter housing (2) can usually be used several times. The panel must not be coated with sealant.**

NOTE: **Bolt, transmission housing to converter housing. See Fig. 2.**

4 - Pull torque converter housing (2) off transmission housing (1).

NOTE: **Ensure that the multi-disk clutch K1 (3) does not fall out.**

5 - Unscrew internal Torx drive bolts (4a) of oil pump (4).

NOTE: **Bolt, oil pump with multi-disk brake B1 to converter housing. See Fig. 2.**

6 - Screw two opposed bolts (a) into the oil pump housing (4) and press the oil pump (4) out of the converter housing (2) by applying light blows with a plastic hammer.

Inspect

7 - Check oil pump (4).

NOTE: **According to condition: Dismantle and assemble oil pump. See DISMANTLING & ASSEMBLING OIL PUMP.**

8 - Check teflon rings (5a) of multi-disk brake B1 (5), replace if necessary.

NOTE: **Insert both teflon rings (5a) into groove with grease so that the joint stays together.**

9 - Install in the reverse order.

Number	Designation		Transmission 722.6 except 722.660/ 661/662/663/ 666/674	Transmission 722.660/661/ 662/663/666/ 674
BA27.40-P-1002-01A	Bolt, transmission housing to torque converter housing	Nm	20	20
BA27.40-P-1003-01A	Bolt, oil pump with multi-disk brake B1 to torque converter housing	Nm	20	20

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Fig. 2: Torque Converter Housing Tightening Torques
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Dismantling & Assembling Oil Pump

1 - Remove pump gears (22 and 23) from pump housing. See **Fig. 3**.

2 - Check radial seal ring (24), replace if necessary.

3 - Replace O-ring (25).

4 - Lubricate pump gears and place in the pump housing. Insert pump gear (22) so that the charger (arrow) points towards the pump housing.

CAUTION: Use ATF oil.

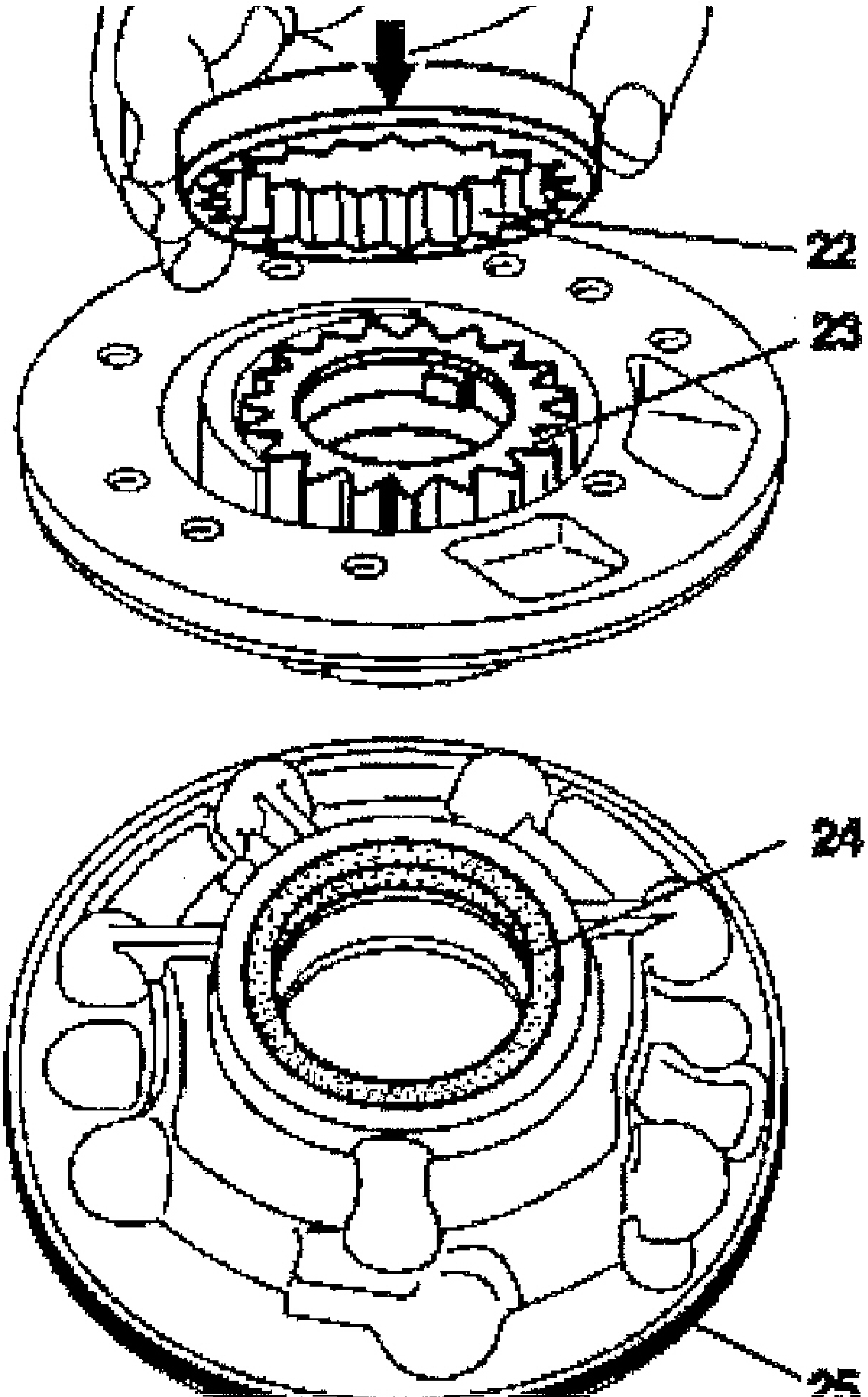
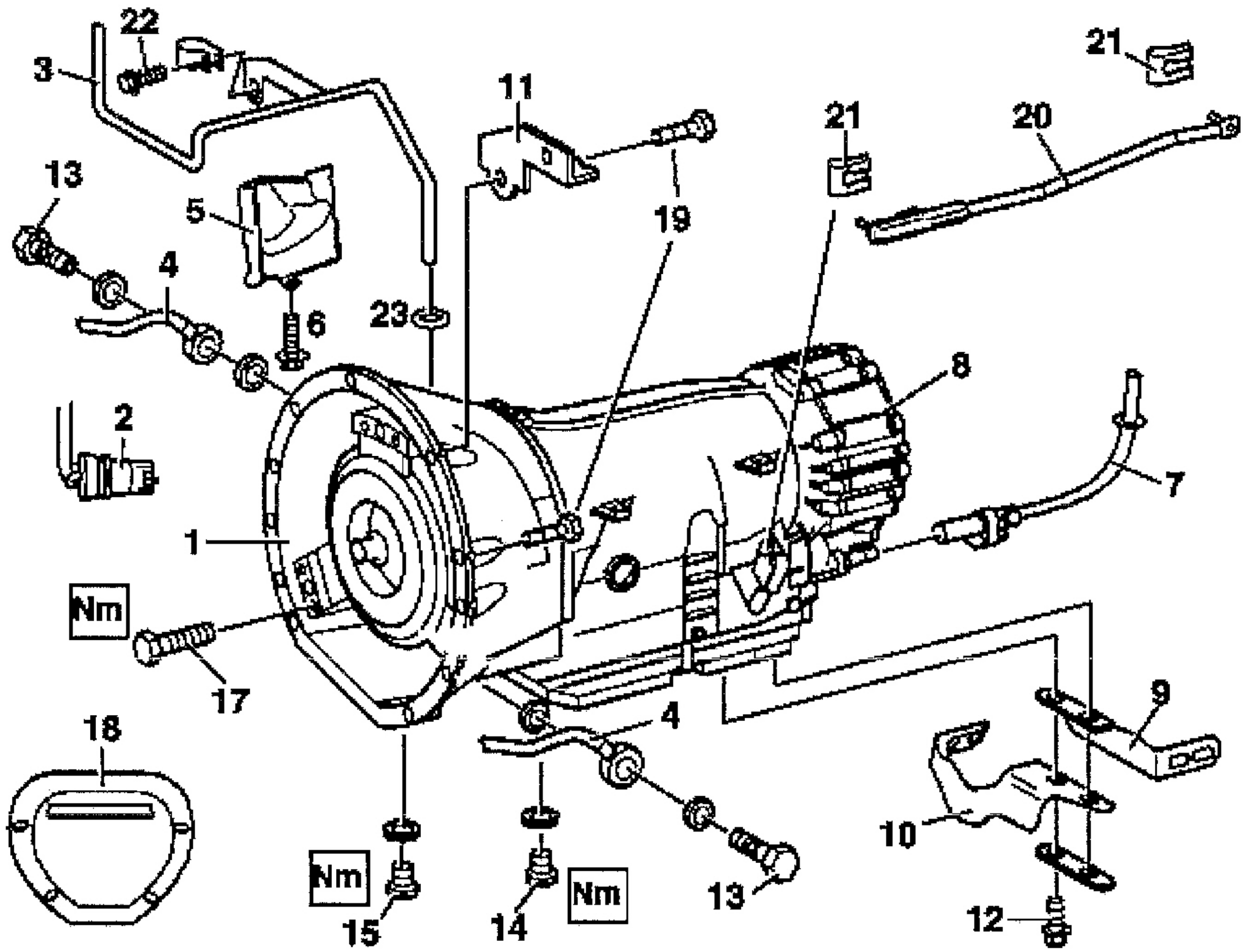

22
23
24
25

Fig. 3: Dismantling & Assembling Oil Pump
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

REMOVE/INSTALL TRANSMISSION WITH TORQUE CONVERTER



Illustrated up to VIN A145272, X708318

1 Torque converter housing
2 13-pin plug connection
3 Oil filler pipe
4 Oil lines
5 Shield
6 Shield fixing bolt
7 Cable for park lock interlock
8 Adapter housing for transfer case
9 Left exhaust bracket
10 Right exhaust bracket
11 Retaining plate
12 Exhaust bracket bolt
13 Oil line bolt
14 Oil drain plug to oil pan
15 Oil drain screw for torque converter
17 Torque converter bolt
18 Cover in oil pan
19 Transmission bolts
20 Shift rod
21 Securing clamps
22 Bolt, oil filler pipe
23 O-ring

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Fig. 4: Removing & Installing Transmission With Torque Converter
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Remove/Install -

1 - Disconnect ground cable of battery. See **DISCONNECT GROUND LEAD FROM BATTERY**.

NOTE: Code radio, set clock, normalize power windows and set timer in vehicles with stationary heater.

2 - Remove transfer case. See TRANSFER CASE .

3 - Unbolt oil filler pipe (3) from crankcase. See **Fig. 4**.

4 - Remove heat shield (5) and disconnect 13-pin plug connector (2).

5 - Remove locking clips (21) and remove shift.

NOTE: Adjust shift rod using pliers. See Fig. 10.

6 - Unscrew oil drain screw on oil pan (14).

7.1 - Unscrew oil drain screw for torque converter (15).

NOTE: If the transmission fluid is burnt or contains wear particles, the oil cooler lines and oil cooler must be flushed out: Flush oil cooler and oil cooler lines.

8.1 - Detach wire for park lock interlock (7) at transmission.

NOTE: Only up to A145272,X708318. For installation and removal, position selector lever or range selector lever in position "P" and leave in position "P" when cable/transmission is removed. See REMOVING & INSTALLING WIRE CABLE/TRANSMISSION FOR PARKING SHIFT LOCK ON TRANSMISSION.

NOTE: Only up to A145272, X708318.
Upon Installation: Adjust cables for parking shift lock. See ADJUSTING WIRE CABLES FOR PARKING LOCK INTERLOCK.

NOTE: Upon Installation: Check function of parking shift lock.

9 - Lambda sensors for primary catalytic converters remove.

10 - Unscrew oil lines (4) to oil cooler from transmission.

11 - Remove cover in oil pan (18) and disconnect torque converter from driven plate at flange.

12 - Unscrew bolts of transmission (19) at crankcase and take out transmission downwards at an angle using a lifting device.

NOTE: Push retainer (11) upwards.

NOTE: Secure torque converter to prevent it from falling out.

13 - Remove torque converter using 168 589 00 62 00 Grab Handle. See **Fig. 9**.

NOTE: Grease the torque converter lightly on drive flange.

14 - Install in reverse order. Torque to specifications. See **Fig. 5** - **Fig. 8** .

15 - Inspect ATF level in automatic transmission, add ATF if necessary.

NOTE: When refilling or after an oil change pour in approximately 5 quarts of transmission oil first.

Designation			Transmission 722.660/661/ 662/663/666/ 674
Bolt, automatic transmission to engine	M10X40	Nm	40
	M10X90	Nm	40
	M12	Nm	-

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Fig. 5: Housing Torque Specifications
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Designation		Transmission 722.6 except 722.628/ 648/649
Oil drain plug on oil pan	Nm	20

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Fig. 6: Automatic Transmission Oil Pan Torque Specifications
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Designation			Transmission 722.6
Oil drain plug to torque converter		Nm	16
Bolt, torque converter to drive plate	M8	Nm	42

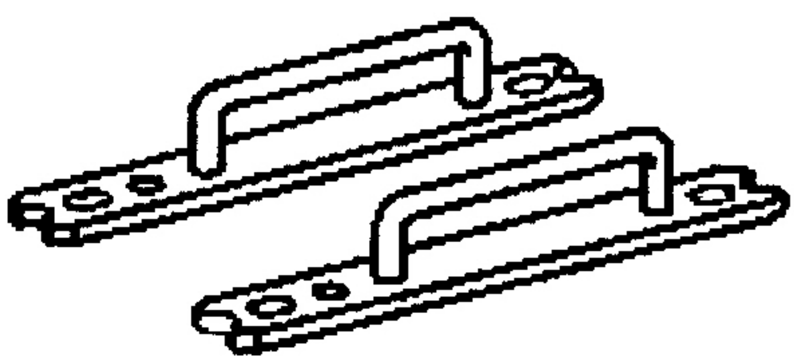
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Fig. 7: Torque Converter Specifications
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Designation		Model 163
Bolt, adapter housing to transmission housing	Nm	20

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Fig. 8: Transfer Case, Complete Unit Torque Specifications
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



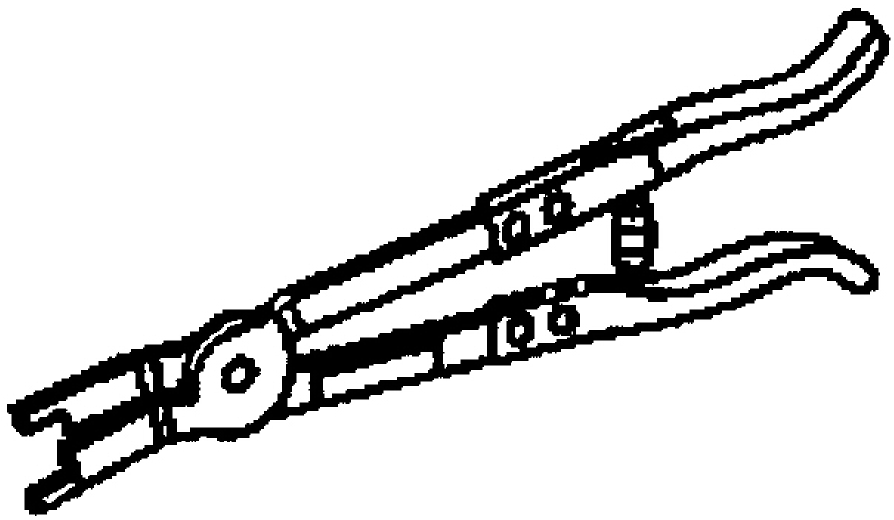
168 589 00 62 00

Use:

Handles (2 ea.) for removal and installation of the torque converter

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Fig. 9: 168 589 00 62 00 Grab Handle
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



210 589 00 37 00

Use:

Pliers for removing and installing the shift rod locking device.

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Fig. 10: 210 589 00 37 00 Pliers
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Designation	Company (e.g.)	Order number
Transmission plate	SLIFT Hebezeug GmbH Daimlerstrasse 9 75233 Tiefenbronn	GP MB

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Fig. 11: Commercially Available Tools
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Designation	Order number
Multi-purpose paste	000 989 80 51 10

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Fig. 12: Auxiliary Repair Materials
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Disconnect Ground Lead From Battery

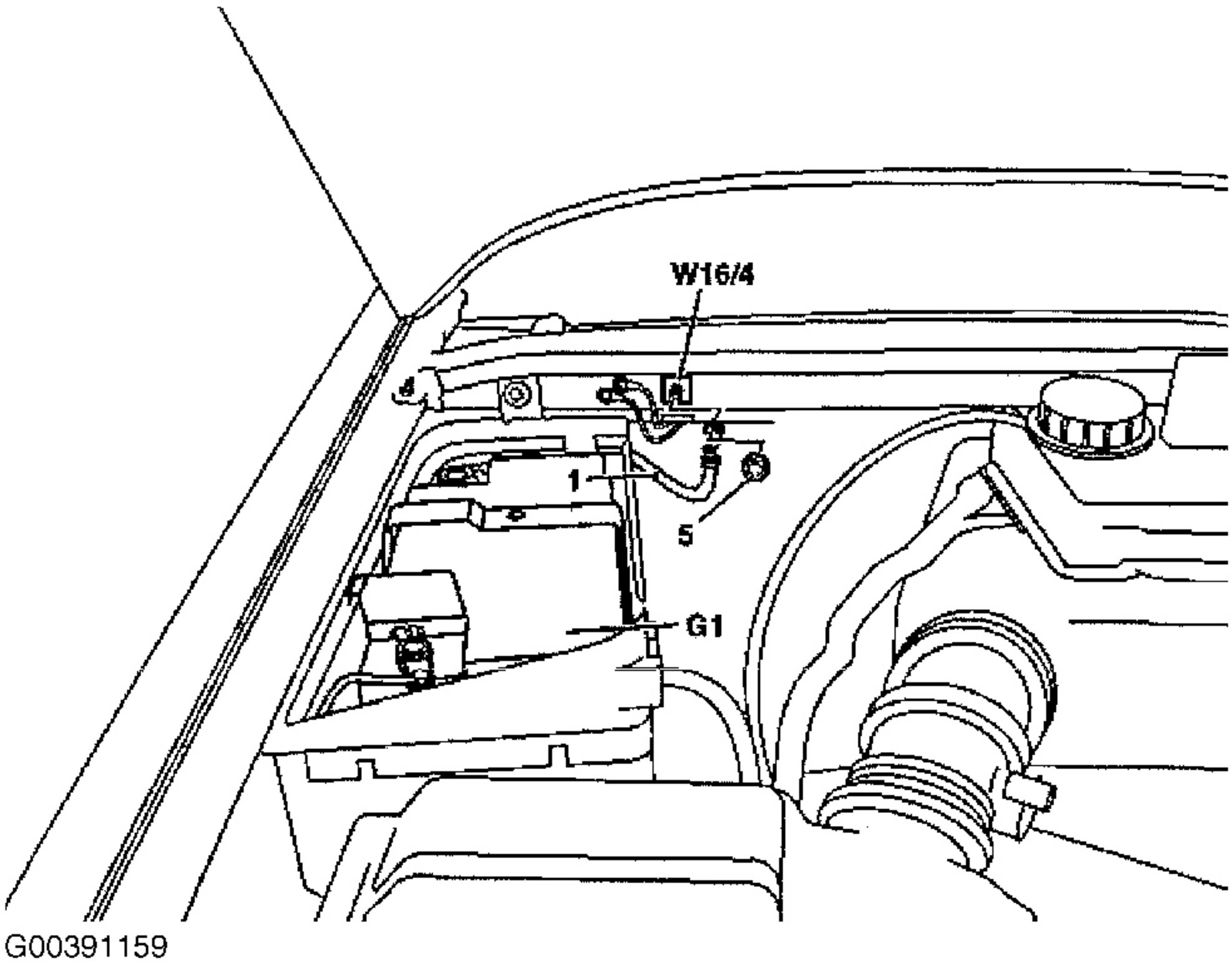


Fig. 13: Disconnecting Ground Lead From Battery
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

1.1 - Open engine hood.

NOTE: Model Series 163.

2 - Disconnect ground cable of battery. See **Fig. 13**.

NOTE: To protect against unwanted contact of the disconnected ground line (1) W16/4 insulate cable lug of the ground line.

NOTE: **After opening the vehicle wait for at least 4 minutes before disconnecting the battery otherwise the alarm will be triggered.**

Connect ground cable.

NOTE: **Model 163: Tighten the nut (5) of the ground line (1) to the specified torque. Perform work described below only when quiescent current retention unit was not connected. Model Series 163 see Torque Specification; Nut Of Ground Cable To Body.**

4 - Code radio.

NOTE: **MB (models 163).**

Hi-Line, premium with Bose (model 163).

5 - Set time at instrument cluster

NOTE: **If necessary set time at stationary heater timer.**

6.1 - Activate steering angle sensor.

7.1 - Synchronize tilt/slide sunroof.

NOTE: **Model 163 with Code 414.**

Open tilt/slide sunroof and hold down switch. Sliding/pop-up roof mechanism moves to end position, pulls back 1/4 turn and stops.

8.1 - Synchronize lamella (thin plate) sliding roof.

NOTE: **Open tilt/slide sunroof and hold down switch. Sliding/pop-up roof mechanism moves to end position, pulls back 1/4 turn and stops.**

9.1 - Synchronize power windows.

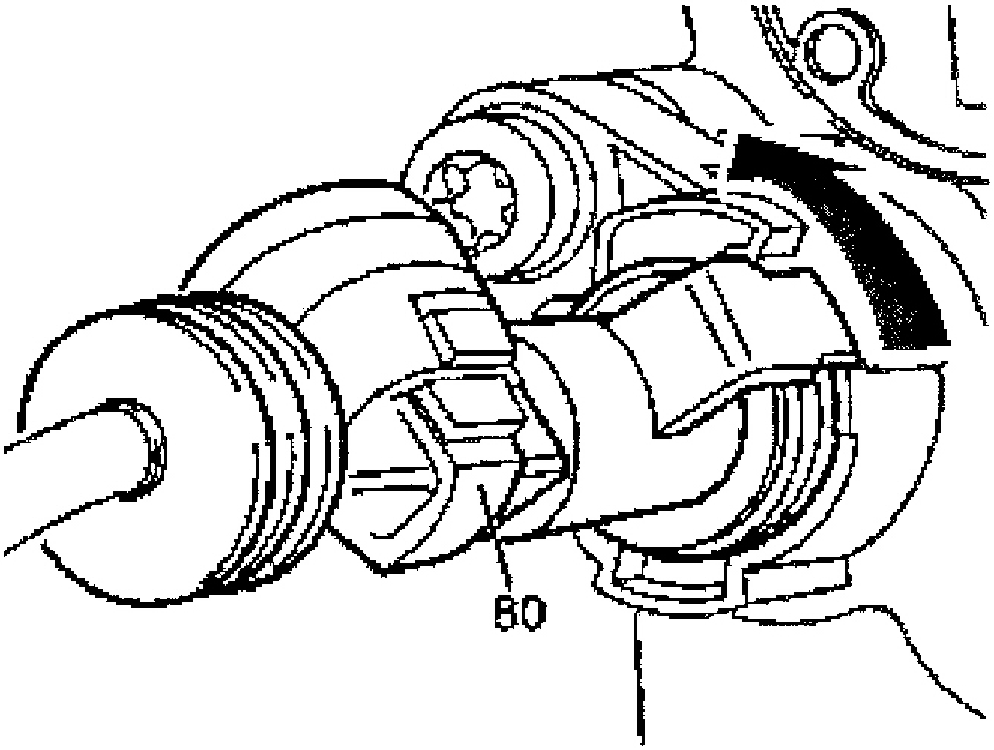
NOTE: **Model 163 as of VIN A289565, X754620.**

Press power windows switch up to the 1st pressure point and, after reaching the upper end position of the window, keep pressed for further 5 seconds.

Torque Specification; Nut Of Ground Cable To Body

Number	Designation		Model Series 163
BA54.10--P-1001--01A	Nut of ground cable to body	NM	18

Removing & Installing Wire Cable/Transmission For Parking Shift Lock On Transmission


80

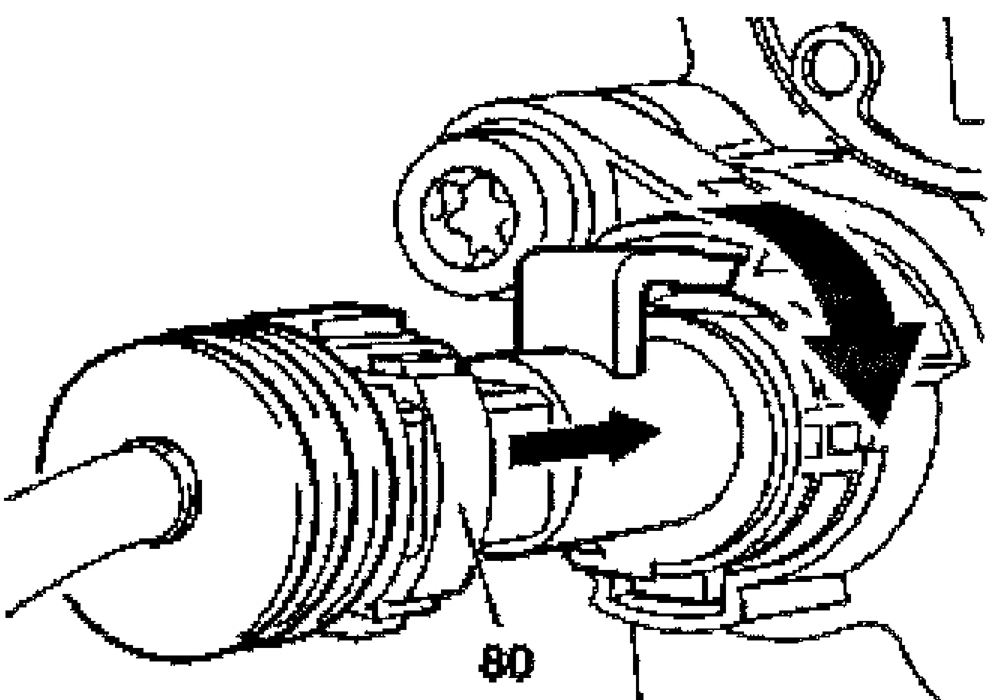

80

Fig. 14: Removing & Installing Wire Cable
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

NOTE: **For removal and installation, move selector lever or range selector lever to position "P" and, with control cable/gears removed, leave in position "P".**

Removing -

1 - Turn cable/transmission (80) on transmission counterclockwise and remove. See **Fig. 14**.

Installation -

2 - Install cable/transmission (80) and turn clockwise.

NOTE: **After installation, adjust cable for parking shift lock and check for proper operation.**

Adjusting Wire Cables For Parking Lock Interlock

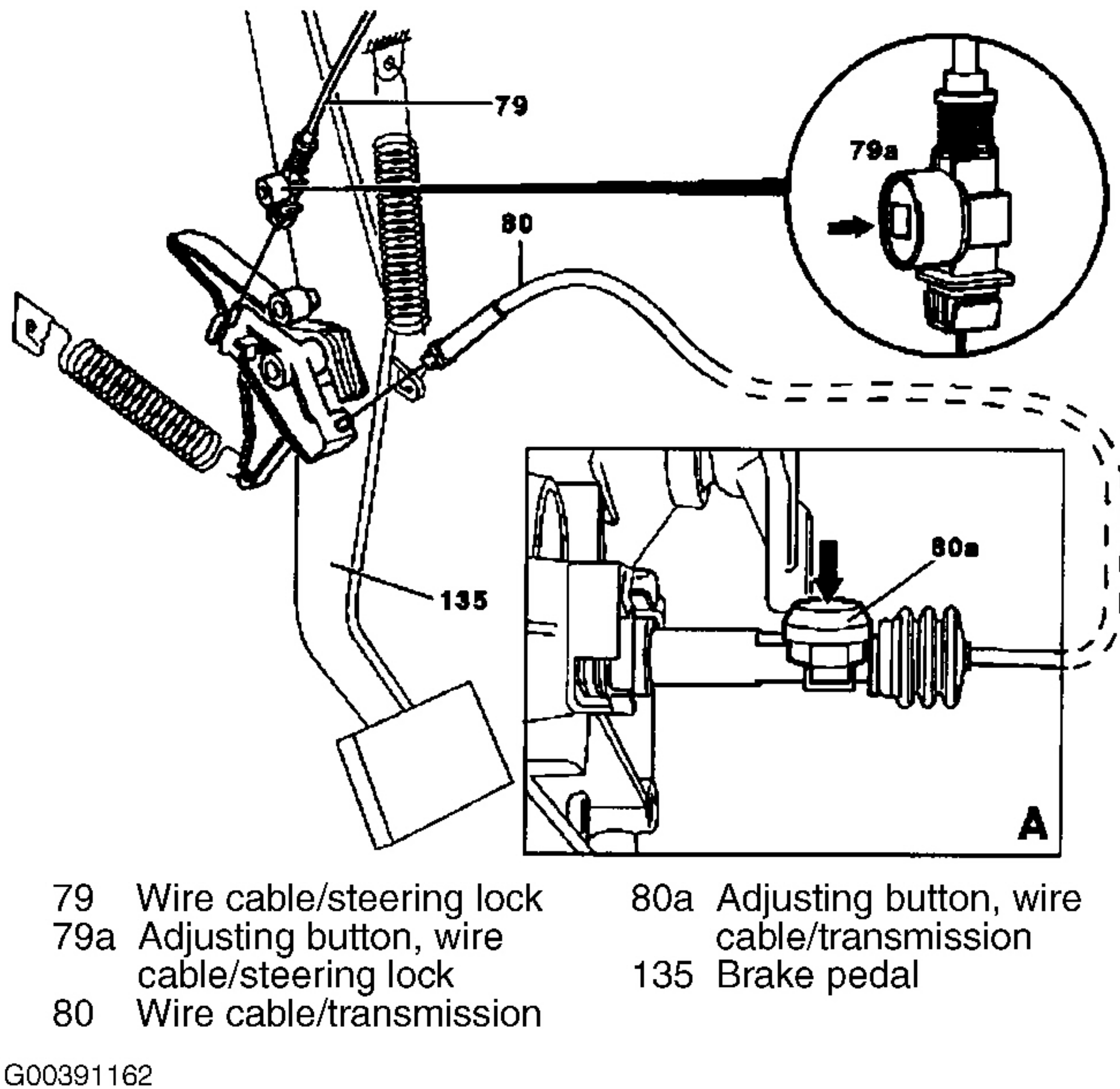


Fig. 15: Adjusting Wire Cables For Parking Lock Interlock
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Modification Notes - Sequence of work steps revised.

NOTE: **The selector lever must be in position "P" for all adjustment work.**

Adjusting wire cable/steering lock.

The wire cable/transmission must be installed to adjust the wire cable/steering lock.

1 - Pretension spring on adjusting button (79a). See **Fig. 15**.
2 - Turn key in steering lock to position "O".
3 - Adjust wire cable/steering lock (79) by pressing adjusting button (79a) (arrow).

Adjusting wire cable/transmission.

4 - Pretension spring on adjusting button (80a).
5 - Turn key in steering lock to position "O".
6 - Adjust wire cable/transmission (80) by pressing the adjusting button (80a) (arrow) Figure A.

AUTOMATIC TRANSMISSION, CONTENTS, FUNCTION DESCRIPTION

NOTE: For transmissions without Touch Shift.

Automatic Transmission, Function

See **AUTOMATIC TRANSMISSION, FUNCTION**.

Automatic Transmission, Location Of Mechanical Components

See **AUTOMATIC TRANSMISSION, LOCATION OF MECHANICAL PARTS**.

Automatic Transmission, Location Of Electrical/Electronic Components

See **AUTOMATIC TRANSMISSION, LOCATION OF ELECTRIC/ELECTRONIC COMPONENTS**.

Automatic Transmission, Location Of Hydraulic Components

See **AUTOMATIC TRANSMISSION, POSITION OF HYDRAULIC COMPONENTS**.

Automatic Transmission, Location Of Floor Shift Components.

See **AUTOMATIC TRANSMISSION, LOCATION OF FLOOR SHIFT COMPONENTS**.

Automatic Transmission, Selector Lever Positions

See **AUTOMATIC TRANSMISSION, SELECTOR LEVER POSITIONS**.

Automatic Transmission, Driver Information

See **AUTOMATIC TRANSMISSION, DRIVER INFORMATION**.

Automatic Transmission, Gear Ratios

See **AUTOMATIC TRANSMISSION, GEAR RATIOS**.

Gearshift System, Function

See **FUNCTION OF GEAR SHIFT**.

Power Transmission, Function

See **AUTOMATIC TRANSMISSION, POWER TRANSMISSION, FUNCTION**.

Power Flow In 1st Gear, Function

See **POWER FLOW IN 1ST GEAR, FUNCTION**.

Power Flow In 2nd Gear, Function

See **POWER FLOW IN 2ND GEAR FUNCTION**.

Power Flow In 3rd Gear, Function

See **POWER FLOW IN 3RD GEAR FUNCTION**.

Power Flow In 4th Gear, Function

See **POWER FLOW IN 4TH GEAR FUNCTION**.

Power Flow In 5th Gear, Function

See **POWER FLOW IN 5TH GEAR FUNCTION**.

Power Flow In Reverse, Function

See **POWER FLOW IN REVERSE, FUNCTION**.

Gearshift System, Function

See **FUNCTION OF GEAR SHIFT**.

Function Of Gear Change

See **FUNCTION OF GEAR CHANGE**.

Shifting "N" To "D" (1st Gear), Function

See **SHIFTING N TO D (1ST GEAR), FUNCTION**.

Function Of Shift From 1 To 2

See **SHIFT FROM 1 TO 2, FUNCTION**.

Limp-home Mode, Function

See **LIMP-HOME MODE, FUNCTION**.

Operating Pressure, Function

See **OPERATING PRESSURE, FUNCTION**.

Lubricating Pressure, Function

See **LUBRICATING PRESSURE, FUNCTION**.

Shift Pressure, Function

See **SHIFT PRESSURE, FUNCTION**.

Modulating Pressure, Function

See **MODULATING PRESSURE, FUNCTION**.

Shift Valve Pressure, Function

See **SHIFT VALVE PRESSURE, FUNCTION**.

Manual Drive Mode Selection, Function

See **MANUAL DRIVE MODE SELECTION, FUNCTION**.

Oil Level Control, Function

See **OIL LEVEL CONTROL, FUNCTION**.

Torque Converter Lockup Clutch Control, Function

See **FUNCTION OF TORQUE CONVERTER LOCKUP CLUTCH CONTROL**.

Torque Converter Lockup Clutch Control Pressure, Function

See **TORQUE CONVERTER LOCKUP CLUTCH CONTROL PRESSURE, FUNCTION**.

Kick-Down, Function

See **KICK-DOWN FUNCTION (UP TO 5/31/02)**.

Hydropneumatic Transmission Control, Function

See **HYDROPNEUMATIC TRANSMISSION CONTROL, FUNCTION**.

Shift-Lock, Function

See **SHIFT-LOCK FUNCTION**.

Function Of Locking Of Selector Lever Position "P"

See **FUNCTION OF LOCKING OF SELECTOR LEVER POSITION "P"**.

Ignition Lock Locking, Function

See **IGNITION LOCK INTERLOCK**.

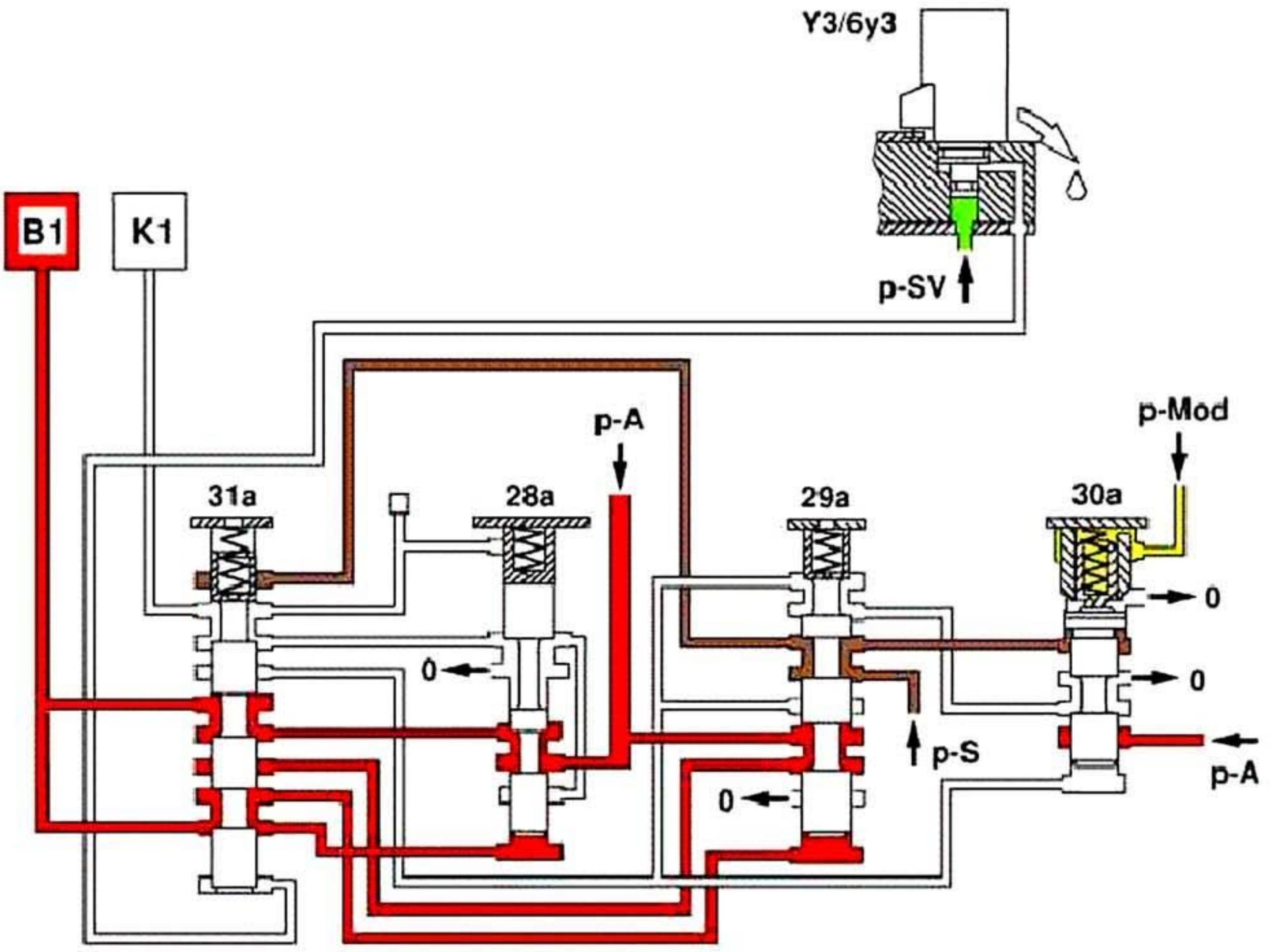
Function Of Shift Lock Override

See **FUNCTION OF SHIFT LOCK OVERRIDE**.

Survey Of System Components, Automatic Transmission, Location/Task/Design/Function

See **SURVEY OF SYSTEM COMPONENTS, AUTOMATIC TRANSMISSION, LOCATION/TASK/DESIGN/FUNCTION**.

Shift From 1 To 2, Function



1 st gear engaged

0	Oil sump drain	K1	Front multiple-disc clutch
28a	1-2/4-5 holding pressure shift valve	p-A	Working pressure
29a	1-2/4-5 shift pressure shift valve	p-Mod	Modulating pressure
30a	Overlap regulating valve 1-2/4-5	p-S	Shift pressure
31a	1-2 / 4-5 command valve	p-SV	Shift valve pressure
B1	Front multiple-disc brake	Y3/6y3	1-2 and 4-5 shift solenoid valve

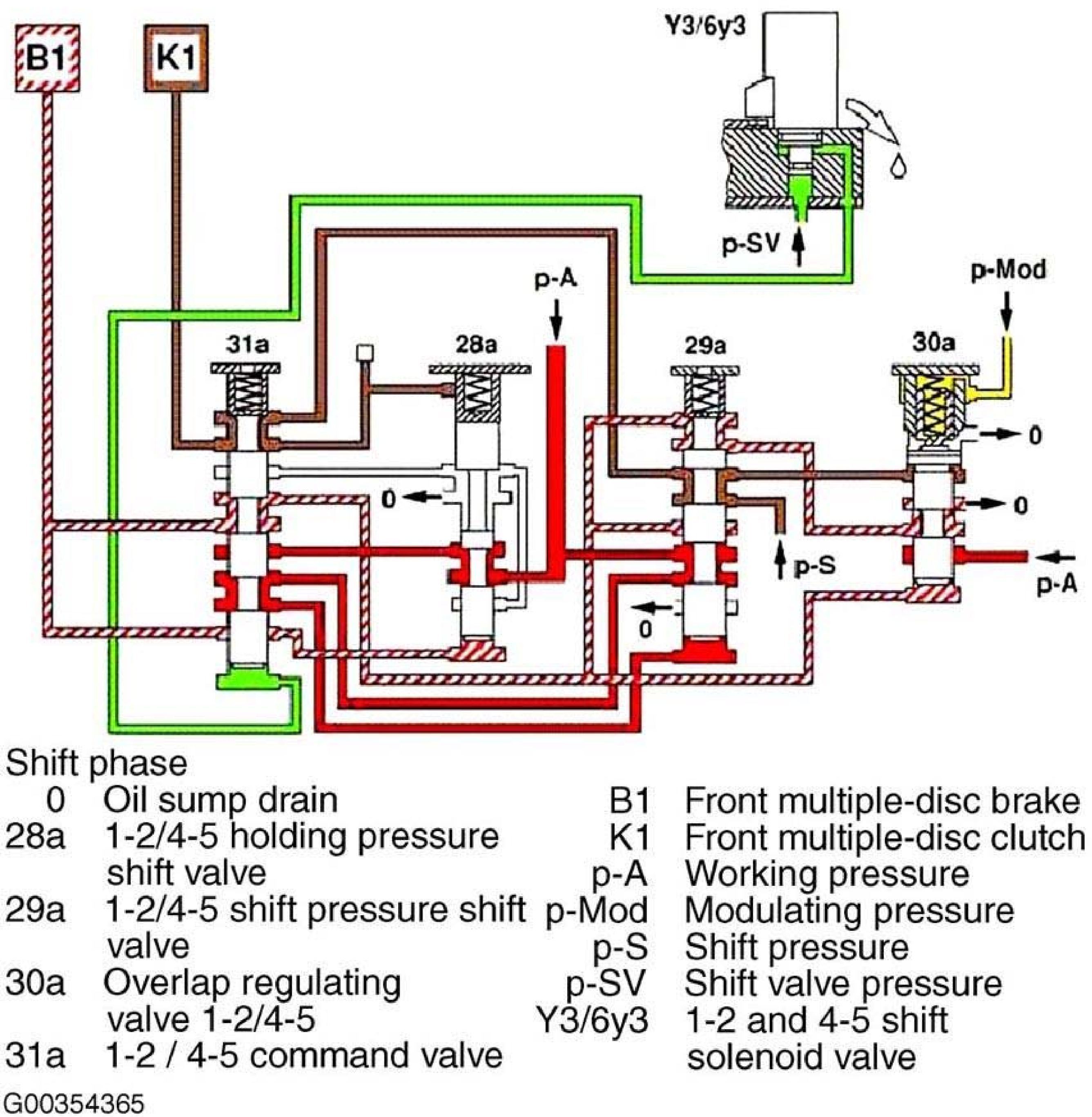
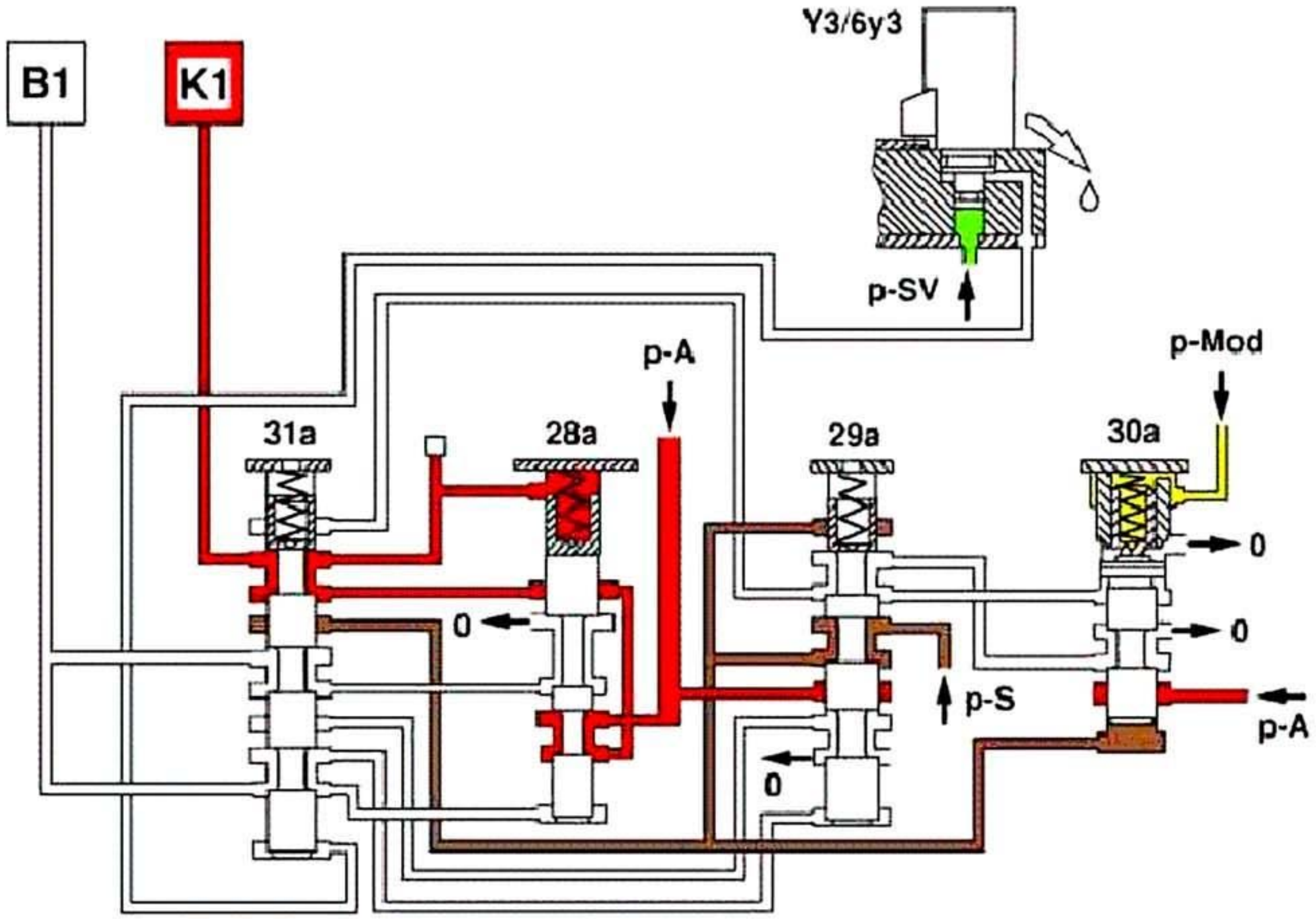


Fig. 16: Shift From 1 To 2, Function (1st Gear Engaged)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Fig. 17: Shift From 1 To 2, Function (Shift Phase)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



2nd gear engaged

0	Oil sump drain	K1	Front multiple-disc clutch
28a	1-2/4-5 holding pressure shift valve	p-A	Working pressure
29a	1-2/4-5 shift pressure shift valve	p-Mod	Modulating pressure
30a	Overlap regulating valve 1-2/4-5	p-S	Shift pressure
31a	1-2 / 4-5 command valve	p-SV	Shift valve pressure
B1	Front multiple-disc brake	Y3/6y3	1-2 and 4-5 shift solenoid valve

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Fig. 18: Shift From 1 To 2, Function (Second Gear Engaged)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Aim

Engage front multiple-disc clutch (K1), disengage front multiple-disc brake (B1).

Operation

1st Gear Engaged See **Fig. 16**.

The end face of the 1-2/4-5 command valve (31a) is kept depressurized via the 1-2 and 4-5 shift solenoid valve (Y3/6y3). Via the 1-2/4-5 holding pressure shift valve (28a), working pressure (p-A) is applied to the front mutiple-disc clutch (K1) is depressurized.

Shift Phase

See **Fig. 17**

Via the 1-2 and 4-5 shift solenoid valve (Y3/6y3), the shift valve pressure (p-SV) is directed onto the end face of the command valve 1-2/4-5 (31a). The 1-2/4-5 command valve (31a) is displaced and the shift pressure (p-S) coming from the 1-2/4-5 shift pressure shift valve (29a) via the 1-2/4-5 command valve (31a) is directed to the front multiple-disc clutch (K1). At the same time the front multiple-disc brake (B1) is subjected to overlap pressure from the 1-2/4-5 overlap regulating valve (30a).

The B1 pressure acting on the end face of the 1-2/4-5 shift pressure shift valve (29a) is superseded by the working pressure (p-A). The increasing shift pressure (p-S) at the front multiple-disc clutch (K1) acts on the annular area of the 1-2/4-5 overlap regulating valve (30a). With an appropriate pressure level at the 1-2/4-5 holding pressure shift valve (28a) this valve switches over.

2nd Gear Engaged

See **Fig. 18**.

After the gear change is complete, the pressure on the end face of the 12-/4-5 command valve (31a) is reduced via the 1-2 and 4-5 shift solenoid valve (Y3/6y3) and the command value is pushed back into its original position. Via the 1-2/4-5 holding pressure shift valve (28a) working pressure (p-A) now reaches the front multiple-disc clutch (K1) via the 1-2/4-5 command valve (31a).

The front multiple-disc brake (B1) is disengaged (depressurized). The spring in the 1-2/4-5 shift pressure shift valve (29a) pushes this into its original position.

Continuation

Operating Pressure, Function

See **OPERATING PRESSURE, FUNCTION**.

Shift Pressure, Function

See **SHIFT PRESSURE, FUNCTION**.

Modulating Pressure, Function

See **MODULATING PRESSURE, FUNCTION**.

Shift Valve Pressure, Function

See **SHIFT VALVE PRESSURE, FUNCTION**.

Lubricating Pressure, Function

See **LUBRICATING PRESSURE, FUNCTION**.

Regulating Valve Pressure, Function

See **REGULATING VALVE PRESSURE, FUNCTION**.

AUTOMATIC TRANSMISSION, CONTENTS, FUNCTION DESCRIPTION

NOTE: Transmission with touch shift.

Automatic Transmission, Function

See **AUTOMATIC TRANSMISSION, FUNCTION**.

Automatic Transmission, Location Of Mechanical Parts

See **AUTOMATIC TRANSMISSION, LOCATION OF MECHANICAL PARTS**.

Automatic Transmission, Location Of Electric/Electronic Components

See **AUTOMATIC TRANSMISSION, LOCATION OF ELECTRIC/ELECTRONIC COMPONENTS**.

Automatic Transmission, Location Of Hydraulic Components

See **AUTOMATIC TRANSMISSION, POSITION OF HYDRAULIC COMPONENTS**

Automatic Transmission, Location Of Components, Floor Shift

See **AUTOMATIC TRANSMISSION, LOCATION OF COMPONENTS, FLOOR SHIFT**.

Automatic Transmission, Selector Lever Positions

See **AUTOMATIC TRANSMISSION, SELECTOR LEVER POSITIONS**.

Automatic Transmission, Gear Ratios

See **AUTOMATIC TRANSMISSION, GEAR RATIOS**.

Power Transmission, Function

See **AUTOMATIC TRANSMISSION, POWER TRANSMISSION, FUNCTION**.

Power Flow In 1st Gear, Function

See **POWER FLOW IN 1ST GEAR, FUNCTION**.

Power Flow In 2nd Gear, Function

See **POWER FLOW IN 2ND GEAR FUNCTION**.

Power Flow In 3rd Gear, Function

See **POWER FLOW IN 3RD GEAR FUNCTION**.

Power Flow In 4th Gear, Function

See **POWER FLOW IN 4TH GEAR FUNCTION**.

Power Flow In 5th Gear, Function

See **POWER FLOW IN 5TH GEAR FUNCTION**.

Power Flow In Reverse, Function

See **POWER FLOW IN REVERSE, FUNCTION**.

Gearshift System, Function

See **FUNCTION OF GEAR SHIFT**.

Function Of Gear Change

See **FUNCTION OF GEAR CHANGE**.

Shifting N To D (1st Gear), Function

See **SHIFTING N TO D (1ST GEAR), FUNCTION**.

Shift From 1 to 2, Function

See **SHIFT FROM 1 TO 2, FUNCTION**.

Limp-Home Mode, Function

See **LIMP-HOME MODE, FUNCTION**.

Operating Pressure, Function

See **OPERATING PRESSURE, FUNCTION**.

Lubricating Pressure, Function

See **LUBRICATING PRESSURE, FUNCTION**.

Shift Pressure, Function

See **SHIFT PRESSURE, FUNCTION**.

Modulating Pressure, Function

See **MODULATING PRESSURE, FUNCTION**.

Regulating Valve Pressure, Function

See **REGULATING VALVE PRESSURE, FUNCTION**.

Shift Valve Pressure, Function

See **SHIFT VALVE PRESSURE, FUNCTION**.

Hydropneumatic Transmission Control, Function

See **HYDROPNEUMATIC TRANSMISSION CONTROL, FUNCTION**.

Manual Drive Mode Selection, Function

See **MANUAL DRIVE MODE SELECTION, FUNCTION**.

Oil Level Control

See **OIL LEVEL CONTROL, FUNCTION**.

Function Of Torque Converter Lockup Clutch Control

See **FUNCTION OF TORQUE CONVERTER LOCKUP CLUTCH CONTROL**.

Torque Converter Lockup Clutch Control Pressure, Function

See **TORQUE CONVERTER LOCKUP CLUTCH CONTROL PRESSURE, FUNCTION**

Shift-Lock, Function

See **SHIFT-LOCK FUNCTION**.

Park Pawl Interlock, Function

See **PARK PAWL INTERLOCK, FUNCTION**.

Steering Lock Interlock, Function

See **STEERING LOCK INTERLOCK, FUNCTION**.

Survey Of System Components, Automatic Transmission, Location/Task/Design/Function

See **SURVEY OF SYSTEM COMPONENTS, AUTOMATIC TRANSMISSION, LOCATION/TASK/DESIGN/FUNCTION**.

Automatic Transmission, Function

NOTE: Transmission Without Touch Shift 722.6 In Model 163.

Automatic transmission 722.6 is an electronically controlled 5-speed transmission with a lockup clutch in the torque converter.

The ratios for the gear stages are achieved by three planetary gear sets. The 5th gear is designed with a step-up ratio as an overdrive.

Shifting is initiated electronically. The gears are shifted by the corresponding combination of three hydraulically actuated multi-disc clutches and two mechanical freewheels.

Basically automatic transmission 722.6 with electronic control offers the following advantages:

- Reduced Fuel Consumption
- Improved Shift Comfort
- More Favorable Gear Steps As A Result Of 5 Gears
- Enhanced Life And Reliability
- Reduced Servicing Costs

The electrohydraulic control unit is bolted onto the bottom of the transmission housing. The end of the transmission is formed by an oil pan made of sheet steel.

The oil pressure for the converter lockup clutch and center multiple-disc clutch is supplied via holes in the input shaft. The oil pressure to the rear mulitiple-disc clutch is routed through the output shaft. The lubricating oil is supplied and distributed by additional bore holes in both shafts. All bearing points of the gear sets as well as freewheels and shift elements are supplied with lubricating oil.

The parking lock gear and drive flange are connected to the output shaft by gearing.

Freewheels F1 and F2 optimize shifting. The front freewheel (F1) rests against the stator shaft extension on the transmission side and connects the sun gear of the front planetary gear set tot the transmission housing in the locking direction.

The torque converter housing and transmission housing are made of a metal alloy. They are bolted together and centered via the outer multiple-disc carrier of the multiple-disc brake B1. A coated intermediate panel seals the two components.

The oil pump and outer multiple-disc carrier of the front multiple-disc brake are bolted to the converter housing. The mechanical part consists of the propeller shaft, output shaft, a sun gear shaft and three planetary gearsets which are coupled together.

In transmissions for powerful engines, the planetary gearsets have 4 planetary gears, while for less powerful engines the front and rear planetary gear system has three planetary gear wheels. The stator shaft is pressed into this and is secured against turning by a spline.

The rear freewheel (F2) connects the sun gear of the center planetary gear set to the sun gear of the rear planetary gearset in the locking direction.

The electrohydraulic control unit consists of the shift plate made of light alloy for hydraulic control and an electronic control unit.

The electrical control unit consists of a supporting body made of plastic in which the electrical components are combined. The shell is screwed tot he shift plate. Conductor tracks which are integrated into the shell, connect the electric components to a plug connector. This 13-pin plug connector forms the connection with the vehicle-side wiring harness and with the ETC 5 (Electronic Transmission Control) control module (N15/5) via a bayonet lock.

Automatic Transmission, Location Of Mechanical Parts

See **AUTOMATIC TRANSMISSION, LOCATION OF MECHANICAL PARTS**.

Automatic Transmission, Location Of Electric/Electronic Components

See **AUTOMATIC TRANSMISSION, LOCATION OF ELECTRIC/ELECTRONIC COMPONENTS**.

Automatic Transmission, Location Of Hydraulic Components

See **AUTOMATIC TRANSMISSION, POSITION OF HYDRAULIC COMPONENTS**.

Automatic Transmission, Location Of Components, Floor Shift

See **AUTOMATIC TRANSMISSION, LOCATION OF COMPONENTS, FLOOR SHIFT**.

Automatic Transmission, Selector Lever Positions

See **AUTOMATIC TRANSMISSION, SELECTOR LEVER POSITIONS**.

Automatic Transmission, Gear Ratios

See **AUTOMATIC TRANSMISSION, GEAR RATIOS**.

Power Transmission, Function

See **AUTOMATIC TRANSMISSION, POWER TRANSMISSION, FUNCTION**.

Gearshift System, Function

See **FUNCTION OF GEAR SHIFT**.

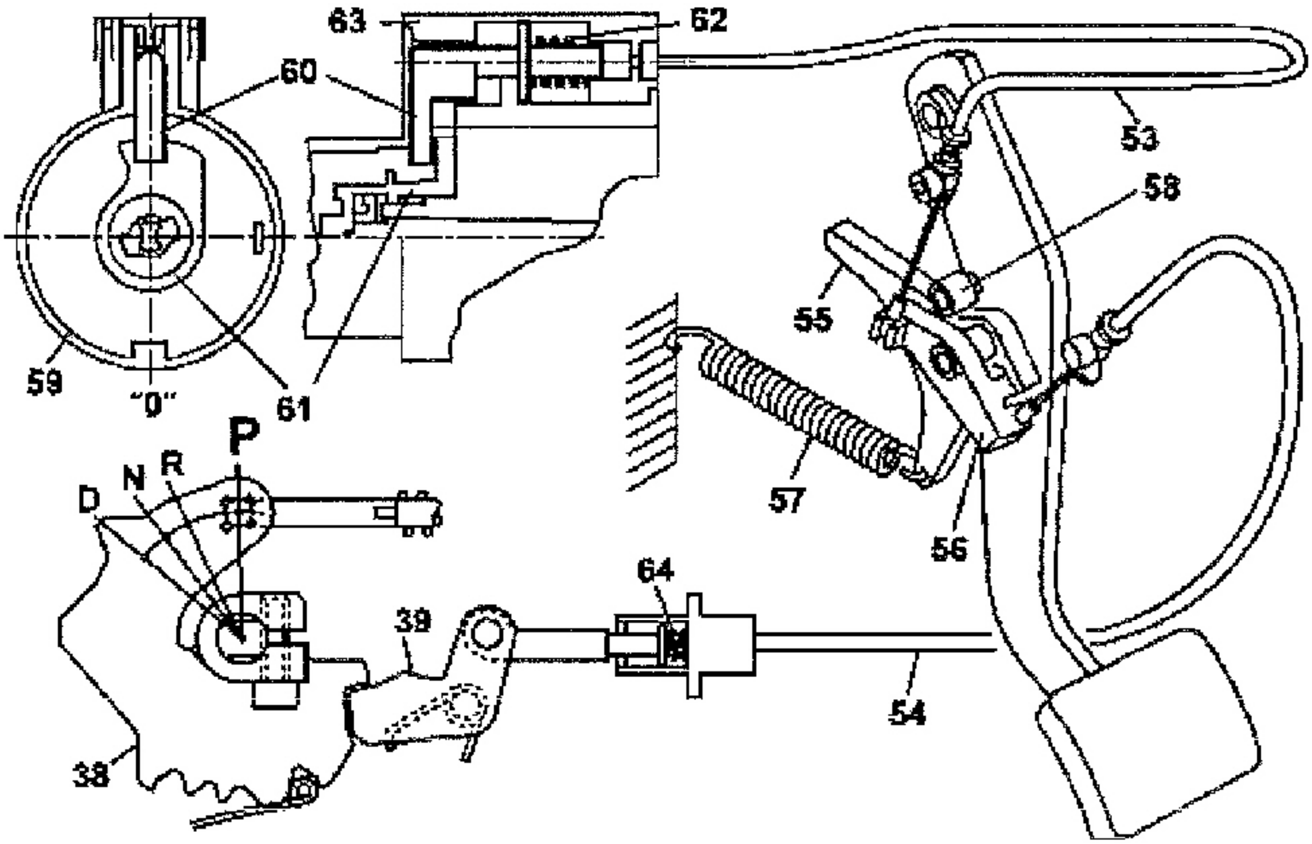
Hydropneumatic Transmission Control, Function

See **HYDROPNEUMATIC TRANSMISSION CONTROL, FUNCTION**.

Shift-Lock, Function

See **SHIFT-LOCK FUNCTION**.

Park Pawl Interlock, Function



"0" Ignition key position 0
38 Detent plate
39 Locking pawl
53 Control cable (ignition switch)
54 Cable (transmission)
55 Locking lever
56 Release lever
57 Tensile spring 58 Roller
59 Steering lock
60 Locking valve
61 Locking cam
62 Compression spring
63 Ignition lock adapter housing
64 Compression spring

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Fig. 19: Park Pawl Interlock, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The parking lock interlock prevents unauthorized release of the parking lock.

If the parking lock is engaged, the ignition key has been removed and the service brake is not activated, the locking pawl (39) blocks the detent plate (38). See **Fig. 19**. The park pawl cannot be released. The park pawl can only be released by turning the ignition key to position "1" and pressing the brake pedal. Starting from ignition key position "1" the locking cam (61) in the steering lock releases the control cable (53). When the brake pedal is depressed, the lock lever (55) and roller (58) are twisted down, the return spring at the brake pedal (57) is tensionsed and the release lever (56) is released.

The force of the pressure spring (64) is now applied via the cables (53, 54) against the lesser force of the pressure spring (62) and pulls the locking valve (60) in front of the contour of the locking cam (61). The locking pawl (39) is simultaneously turned via the link rod and lifts up off the detent plate (38).

The parking lock can now be released.

The design of the parking lock interlock is the same as for the steering lock interlock and it functions with reciprocal action to the steering lock interlock.

Steering Lock Interlock, Function

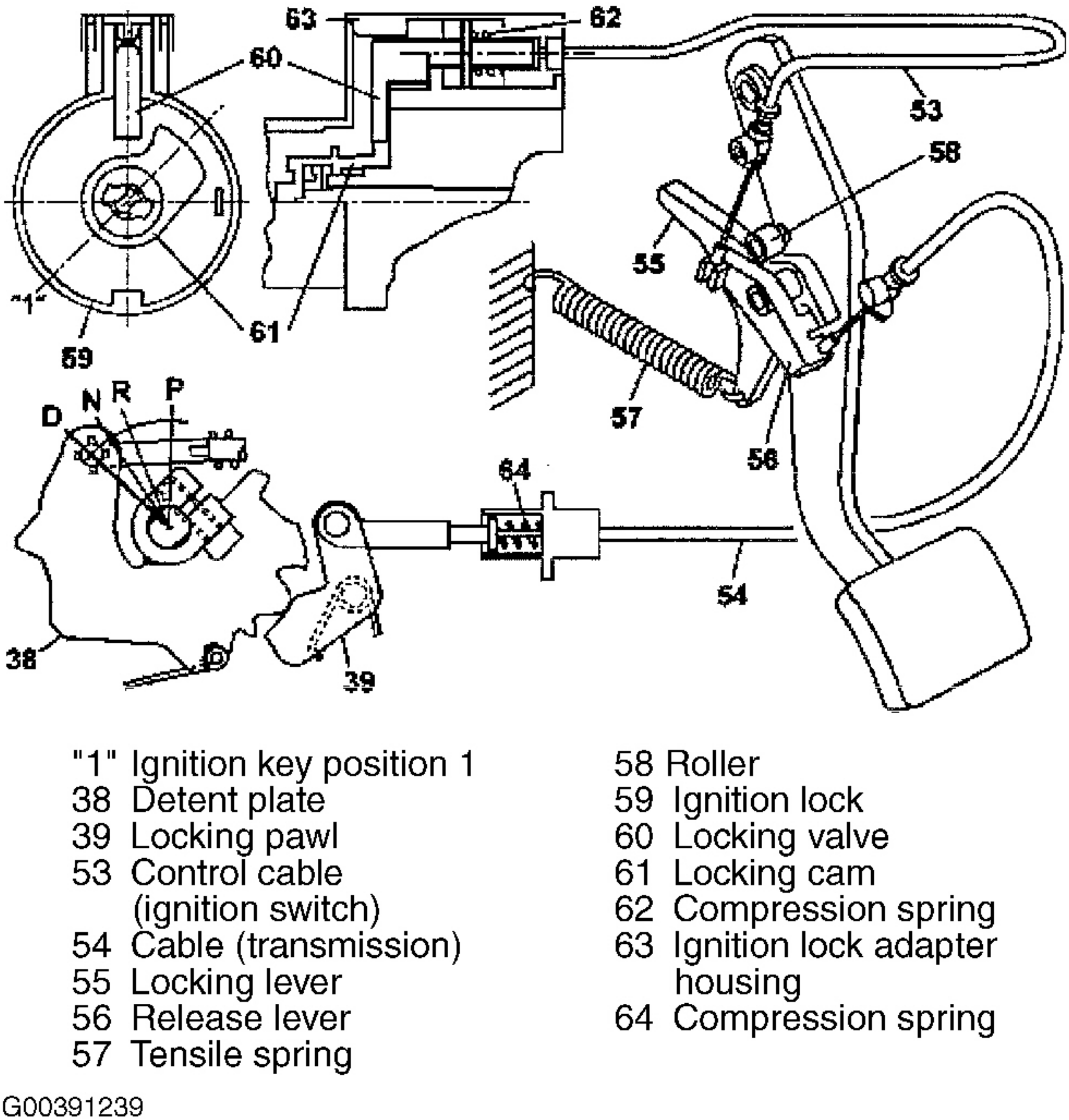


Fig. 20: Steering Lock Interlock, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The steering lock interlock prevents the ignition key being removed when the parking lock is not engaged.

The locking pawl (39) is positioned on the exterior contour of the detent plate (38) if the parking lock is not engaged and if the brake pedal is not depressed. See **Fig. 20**.

The cables (53, 54) hold the locking valve (60) in its position in front of the locking cam (61) against the force of the pressure spring. Therefore, the ignition key cannot be turned to the "0" position.

In selector lever position "P" and with the brake pedal in the rest position, the force of the return spring (57) can pull the locking pawl (39) under the stop at the detent plate (38) and the pressure spring (62) simultaneously pulls the locking valve (60) away from the locking cam (61).

The ignition key can now be turned to the "0" position and removed from the ignition.

The design of the parking lock interlock is the same as for the steering lock interlock and it functions with reciprocal action to the steering lock interlock.

Parking Lock, Location/Task/Design/Function

See **PARKING LOCK, LOCATION/TASK/DESIGN/FUNCTION**.

Parking Lock, Location/Task/Design/Function

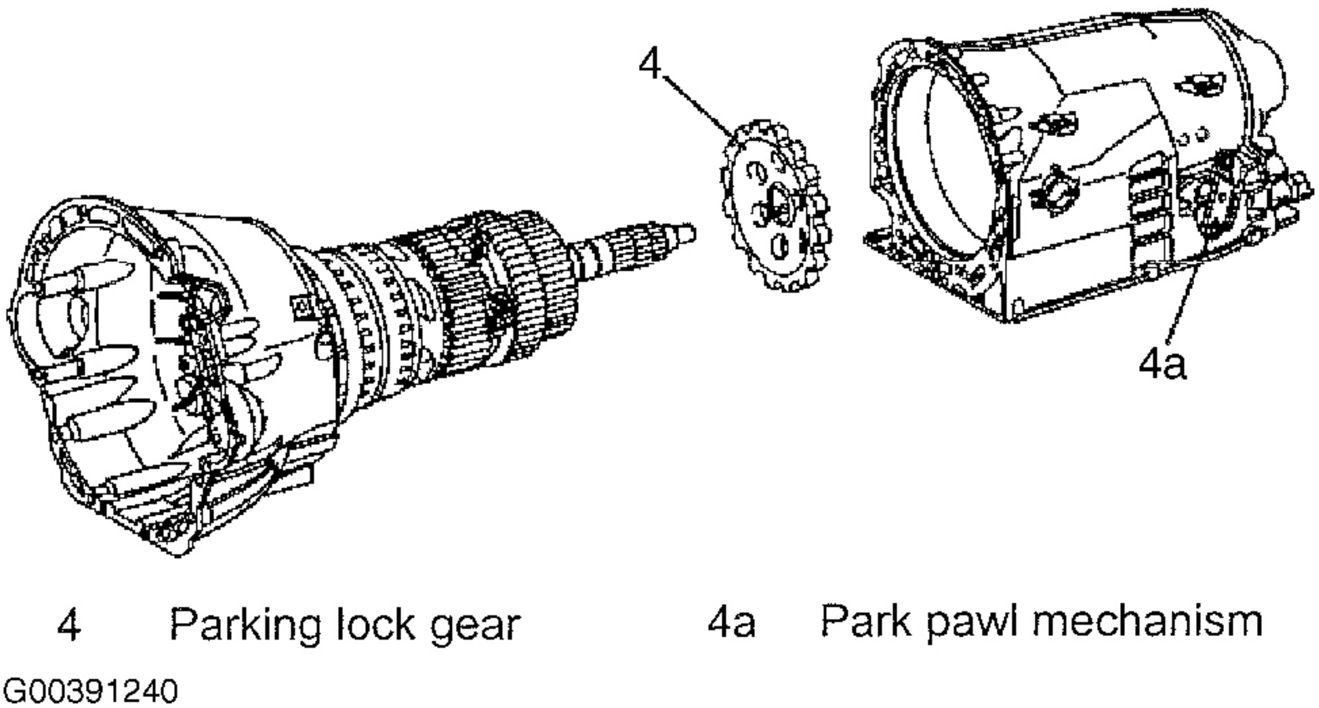


Fig. 21: Parking Lock
Courtesy of MERCEDES BENZ OF NORTH AMERICA

Park Pawl, Location

The park pawl gear (4) and park pawl mechanism (4b) are located in he rear section of the transmission housing. See **Fig. 21**.

Park Pawl, Task

In addition to the parking brake, the park pawl provides extra mechanical security against the vehicle rolling away.

Park Pawl, Design

See **PARK PAWL, DESIGN**.

Park Pawl, Function

See **PARK PAWL, FUNCTION**.

Park Pawl, Design

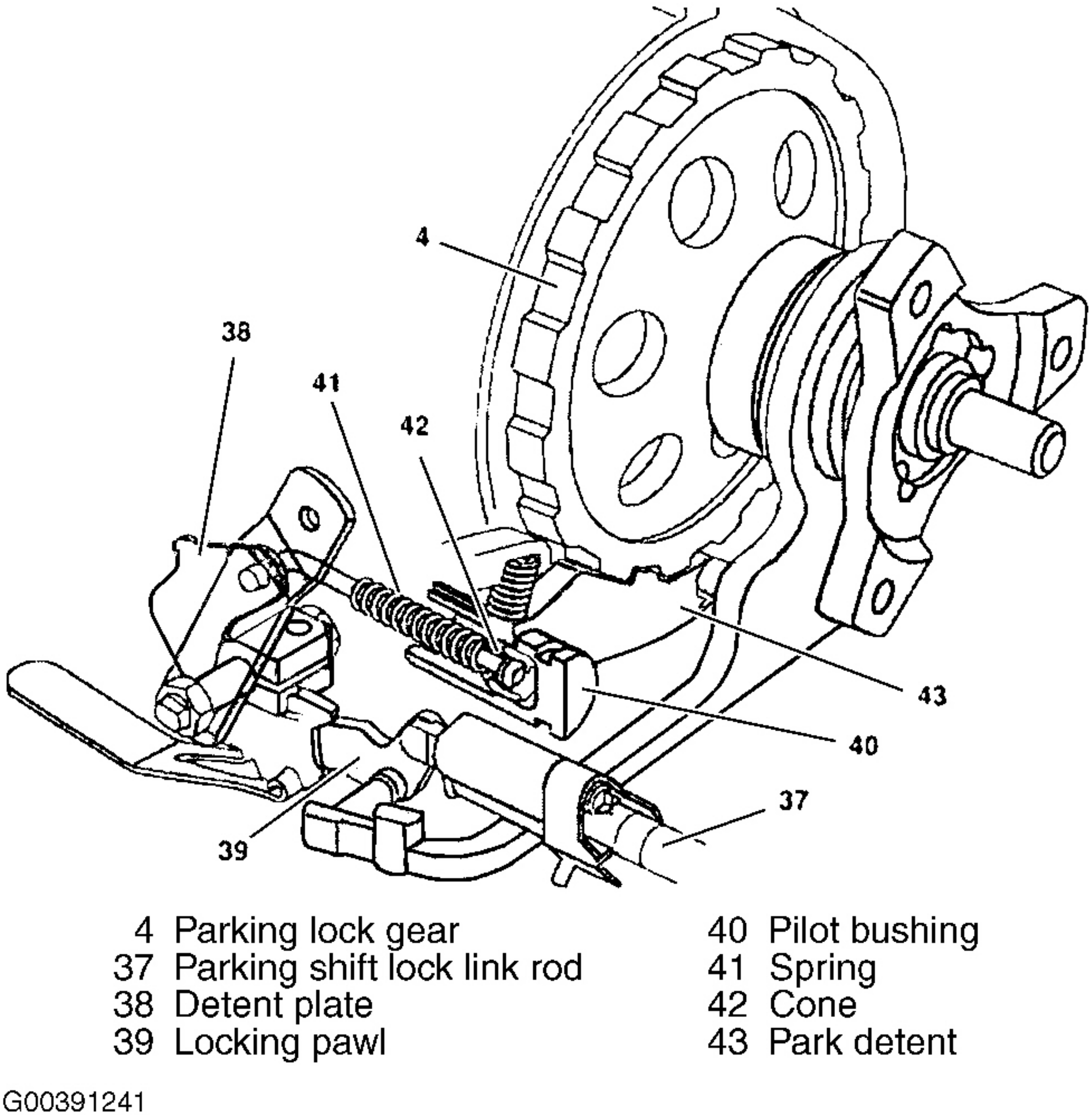


Fig. 22: Park Pawl, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Structure

The parking lock mechanism consists of the parking lock gear (4), the parking lock pawl (43), the cone (42) with spring (41) and the guide sleeve (4). See **Fig. 22**. The parking shift lock is actuated by the locking pawl (39) and link rod (37) via the detent plate (38).

Park Pawl, Function

See **Fig. 22**.

Operation

In selector lever position "P", the cone (42) slides between the parking lock pawl (43) and the guide sleeve (40). The parking lock pawl (43) is therefore pushed against the parking lock gear (4). If the tooth of the parking lock pawl (43) does not engage in a tooth space when the vehicle is stationary, but rather touches a tooth of the parking lock gear (4), the cone (42) is pre-tensioned by the spring (41) and positioned ready for operation. If the parking lock gear (4) continues to turn, the parking lock pawl (43) engages in the next tooth space.

To prevent damage due to misuse, the intervals between the tooth gaps are such that the park detent (43) can only engage when the vehicle is stationary or crawling at low speed. If the vehicle rolls faster, the shape of the teeth prevents the parking lock pawl (43) from engaging.

AUTOMATIC TRANSMISSION MODEL AND COMPONENT INSTALLATION SURVEY AS-BUILT CONFIGURATION

Transmission 722.6 In Model 163

Component survey for automatic transmission. See **COMPONENT SURVEY FOR AUTOMATIC TRANSMISSION MODEL 163**.

COMPONENT SURVEY FOR AUTOMATIC TRANSMISSION MODEL 163

Sales Designation	Model	Engine	Transmission
ML 230	163.136	111.977	722.660
ML 270 CDI	163.113	612.963	722.661
ML 320	163.154	112.942	722.662
ML 350	163.157	112.970	722.674
ML 400	163.128	628.963	722.673
ML 400 CDI	163.128	628.963	722.666
ML 430	163.172	113.942	722.663
ML 500	163.175	113.965	722.666
ML 55 AMG	163.174	113.981	722.666

SURVEY OF SYSTEM COMPONENTS, AUTOMATIC TRANSMISSION, LOCATION/TASK/DESIGN/FUNCTION (WITHOUT TOUCH SHIFT)

NOTE: Transmission Without Touch Shift 722.6 In Model 163

Starter Lock-Out Contact, Location/Task/Design/Function

See **STARTER LOCK-OUT CONTACT, LOCATION/TASK/DESIGN/FUNCTION**.

Torque Converter, Location/Task/Design/Function

See **TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION**.

Wheel Speed Sensor Location/Task/Function

See **WHEEL SPEED SENSOR, LOCATION/TASK/FUNCTION**.

Electric Control Module, Location/Task/Design/Function

See **ELECTRONIC CONTROL MODULE, LOCATION/TASK/DESIGN/FUNCTION**.

D-4 Shift Isolating Mechanism, Location/Task/Design/Function

See **D-4 SHIFT ISOLATING MECHANISM, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of Freewheel

See **LOCATION/TASK/DESIGN/FUNCTION OF FREEWHEEL**.

Transmission Range Recognition Switch, Location/Task/Design/Function

See **TRANSMISSION RANGE RECOGNITION SWITCH, LOCATION/TASK/DESIGN/FUNCTION**.

Kickdown Switch, Location/Task/Design/Function

See **KICKDOWN SWITCH, LOCATION/TASK/DESIGN/FUNCTION MODEL 163 WITHOUT TOUCH SHIFT**.

Location/Task/Design/Function Of Command Valve

See **LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Floor Shift, Location/Task/Design/Function

See **FLOOR SHIFT, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Parking Lock, Location/Task/Design/Function

See **PARK PAWL, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**.

Position Sensor, Location/Task/Function

See **POSITION SENSOR, LOCATION/TASK/FUNCTION**.

Location/Task/Design/Function Of PWM Solenoid Valve, Torque Converter Lockup Clutch

See **LOCATION/TASK/DESIGN/FUNCTION OF PWM SOLENOID VALVE, TORQUE CONVERTER LOCKUP CLUTCH**.

Modulating Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **MODULATING PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Working Pressure Regulating Valve, Location/Task/Function

See **WORKING PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Regulating Valve Pressure Regulating Valve

See **REGULATING VALVE PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Regulating Valve, Location/Task/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Shift Valve Pressure Regulating Valve, Location/Task/Function

See **SHIFT VALVE PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Lubrication Pressure Regulating Valve, Location/Task/Function

See **LUBRICATION PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Task/Function

See **OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Torque Converter Lockup Clutch Regulating Valve, Location/Task/Function

See **TORQUE CONVERTER LOCKUP CLUTCH REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Location/Task/Design Function Of R/P Lock

See **R/P LOCK, LOCATION/TASK/DESIGN/FUNCTION**.

Reverse Lamp Switch, Location/Task/Function

See **REVERSE LAMP SWITCH, LOCATION/TASK/FUNCTION**.

Shift Detent Mechanism, Location/Task/Design/Function

See **SHIFT DETENT MECHANISM, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Task/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Task/Function

See**SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Float, Location/Design/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

ETC Control Module, Location/Task

See **ETC CONTROL UNIT, LOCATION/TASK**.

Temperature Sensor, Location/Task/Design/Function

See **TEMPERATURE SENSOR, LOCATION/TASK/DESIGN/FUNCTION**.

Selector Valve, Location/Task

See **SELECTOR VALVE, LOCATION/TASK**.

Torque Converter Lock-Up Clutch, Location/Task/Design/Function

See **TORQUE CONVERTER LOCK-UP CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Automatic Transmission, Contents, Function Description

See **AUTOMATIC TRANSMISSION, CONTENTS, FUNCTION DESCRIPTION**.

D-4 Shift Isolating Mechanism, Location/Task/Design/Function

NOTE: **Transmission Without Touch Shift. 722.6 In Model 163**

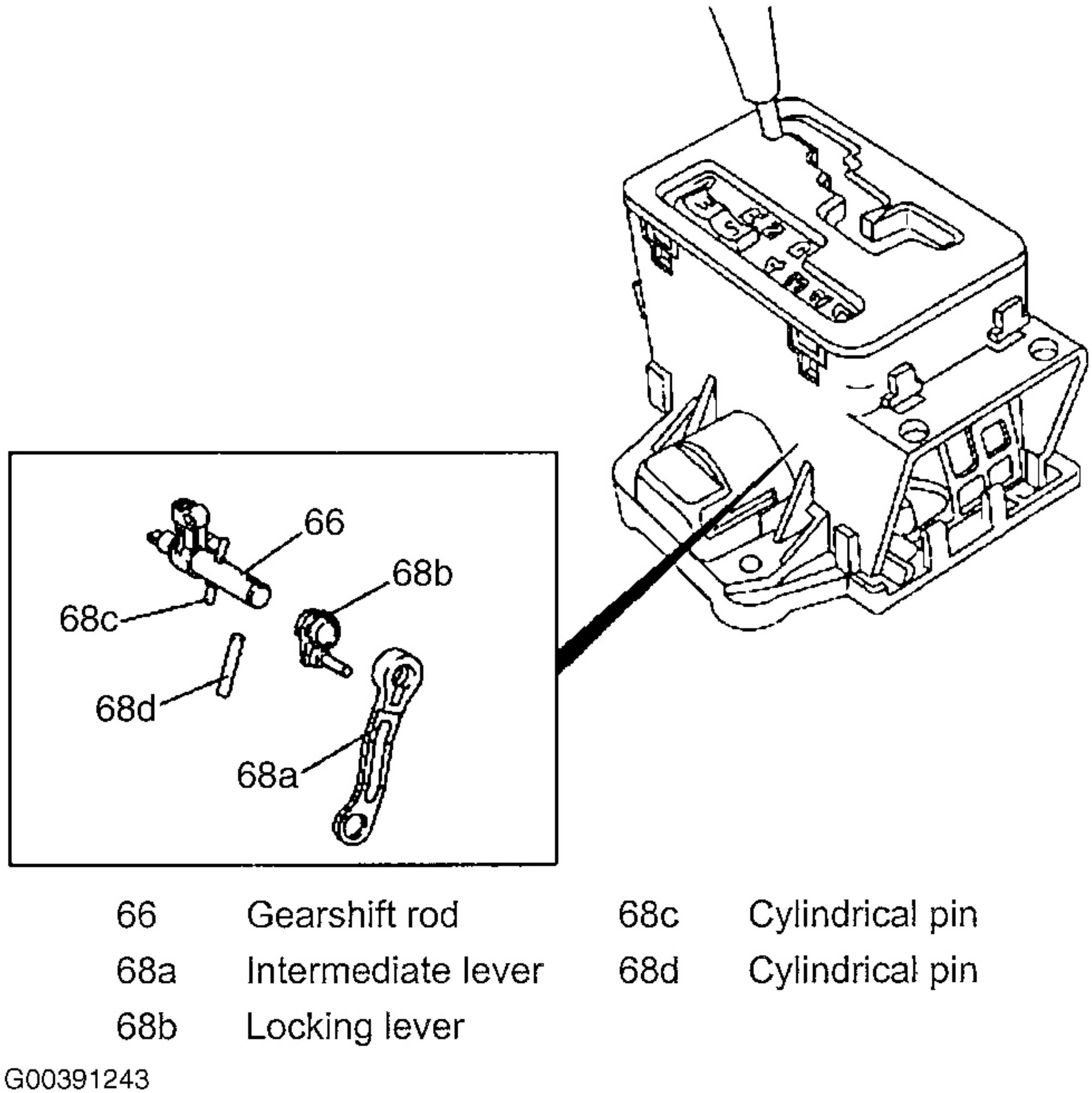


Fig. 23: D-4 Shift Isolating Mechanism
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Isolating Mechanism For D-4 Shift, Function

The D-4 shift isolating mechanism is integrated into the floor shift. See **Fig. 23**.

Isolating Mechanism For D-4 Shift, Task

Isolates the shift rod to the transmission from the floor shift.

Isolating Mechanism For D-4 Shift, Design

The isolating mechanism for D-4 shift consists of:

- A Recess In The Intermediate Lever (68A)
- The Lock Lever (68B)
- Two Straight Pins (68C, 68D)

Isolating Mechanism For D-4 Shift, Function

See **ISOLATING MECHANISM FOR D-4 SHIFT, FUNCTION**.

Isolating Mechanism For D-4 Shift, Function

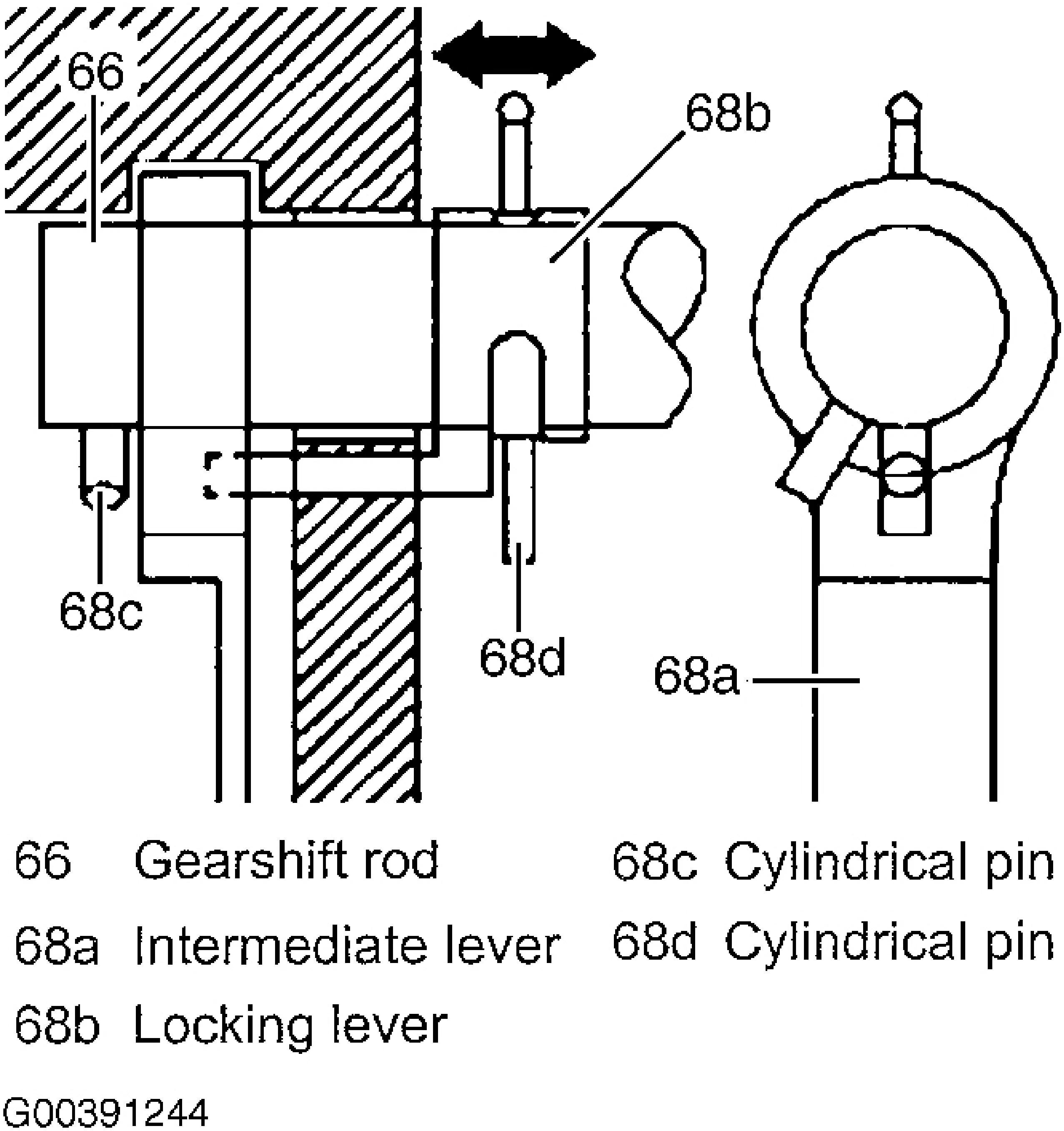


Fig. 24: Isolating Mechanism For D-4 Shift, Function

Operation

When the selector lever is moved across from "D" to "4", the shift shaft (66) is moved axially to the left and the straight pin (68c) is thus pushed out of the intermediate lever (68a). See **Fig. 24**.

At the same time the lock lever (68b) is pushed into the recess in the intermediate lever (68a). The locking lever (68b) locks the intermediate lever (68a). This fixes the shift rod in selector lever position "D". The straight pin (68d) fixes the lock lever (68b) on the shift shaft (66) and projects into a recess in the guide plate. This recess allows the shift shaft (66) to be moved in the transverse direction only when the selector lever is in position "D".

Transmission Range Recognition Switch, Location/Task/Design/Function

NOTE: Transmission Without Touch Shift

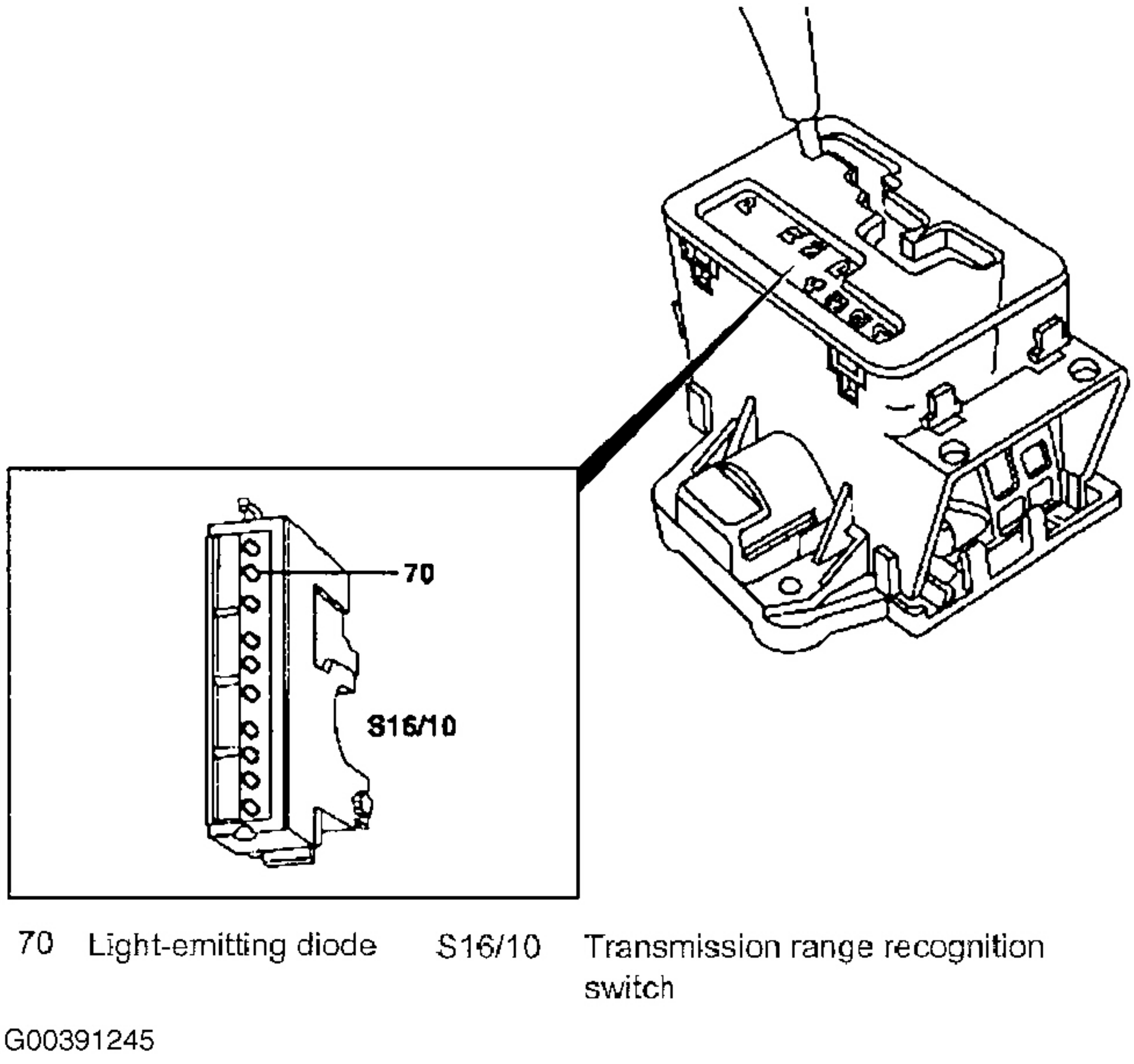


Fig. 25: Transmission Range Recognition Switch
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Transmission Range Recognition Switch, Location

The gear identification switch (S16/10) is located in the floor selector. See **Fig. 25**.

Transmission Range Recognition Switch, Task

To convey the respective position of the selector lever to the ETC control module (N15/3).

Transmission Range Recognition Switch, Design

The gear identification switch (S16/10) consists of the shift range contacts for all gears, the reverse lamp switch (S16/10s1) as well as 10 LEDs (70) for the background illumination and the individual position display.

Transmission Range Recognition Switch, Function

The selector lever positions are transferred to the gear identification switch (S16/10) by a plug pin, which is connected to the shift shaft, and processed into a position signal. This signal is passed to the ETC control module (N15/3).

Position Sensor, Location/Task/Function

NOTE: Transmission Without Touch Shift

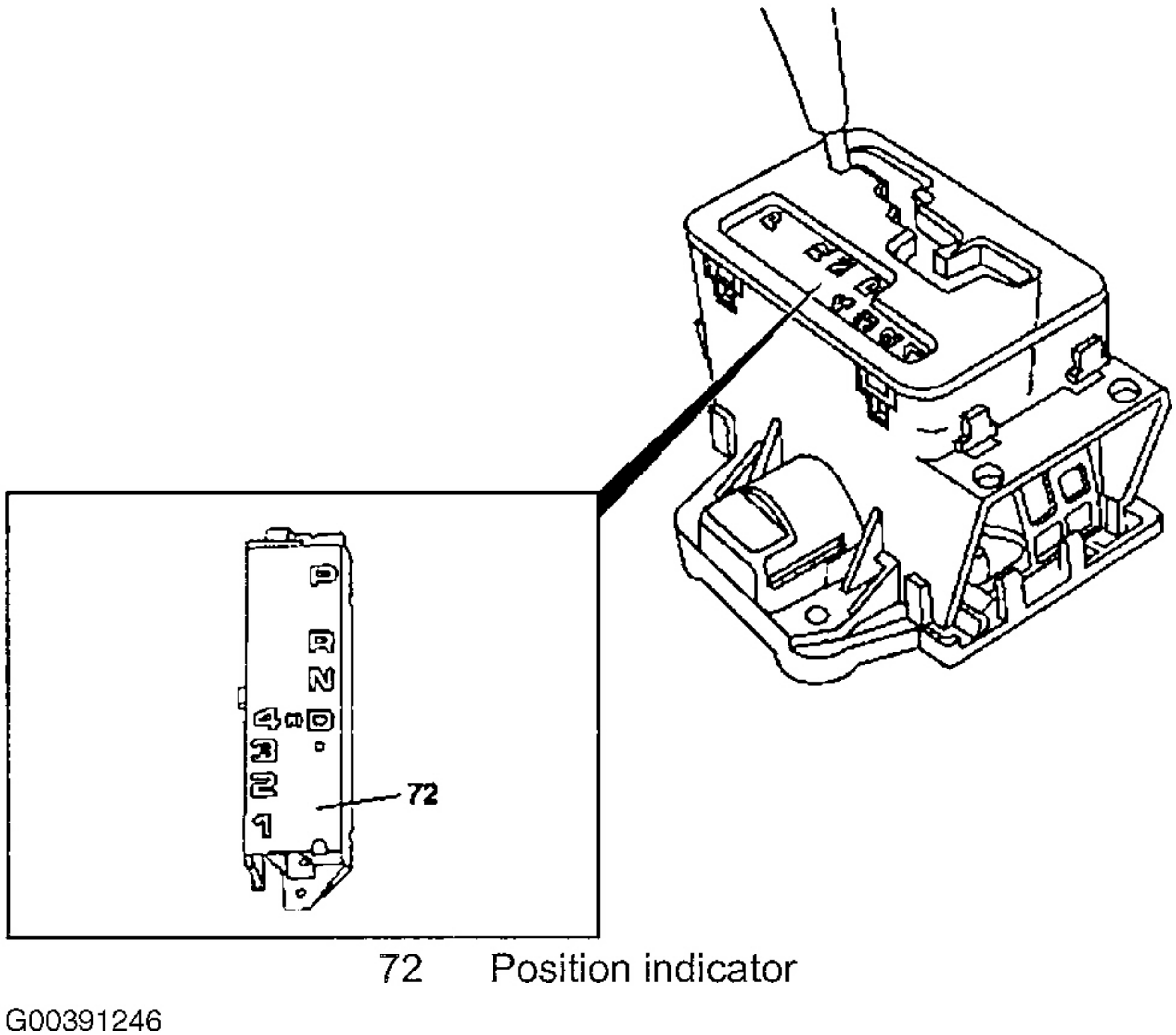


Fig. 26: Position Sensor, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Pattern Display, Location

The position indicator (72) is located in the floor shift. See **Fig. 26**.

Shift Pattern Display, Task

Visual display of the selector lever position.

Shift Pattern Display, Function

The position indicator (72) is actuated via the transmission range recognition switch (S16/10).

Reverse Lamp Switch, Location/Task/Function

NOTE: Transmission Without Touch Shift 722.6 In Model 163

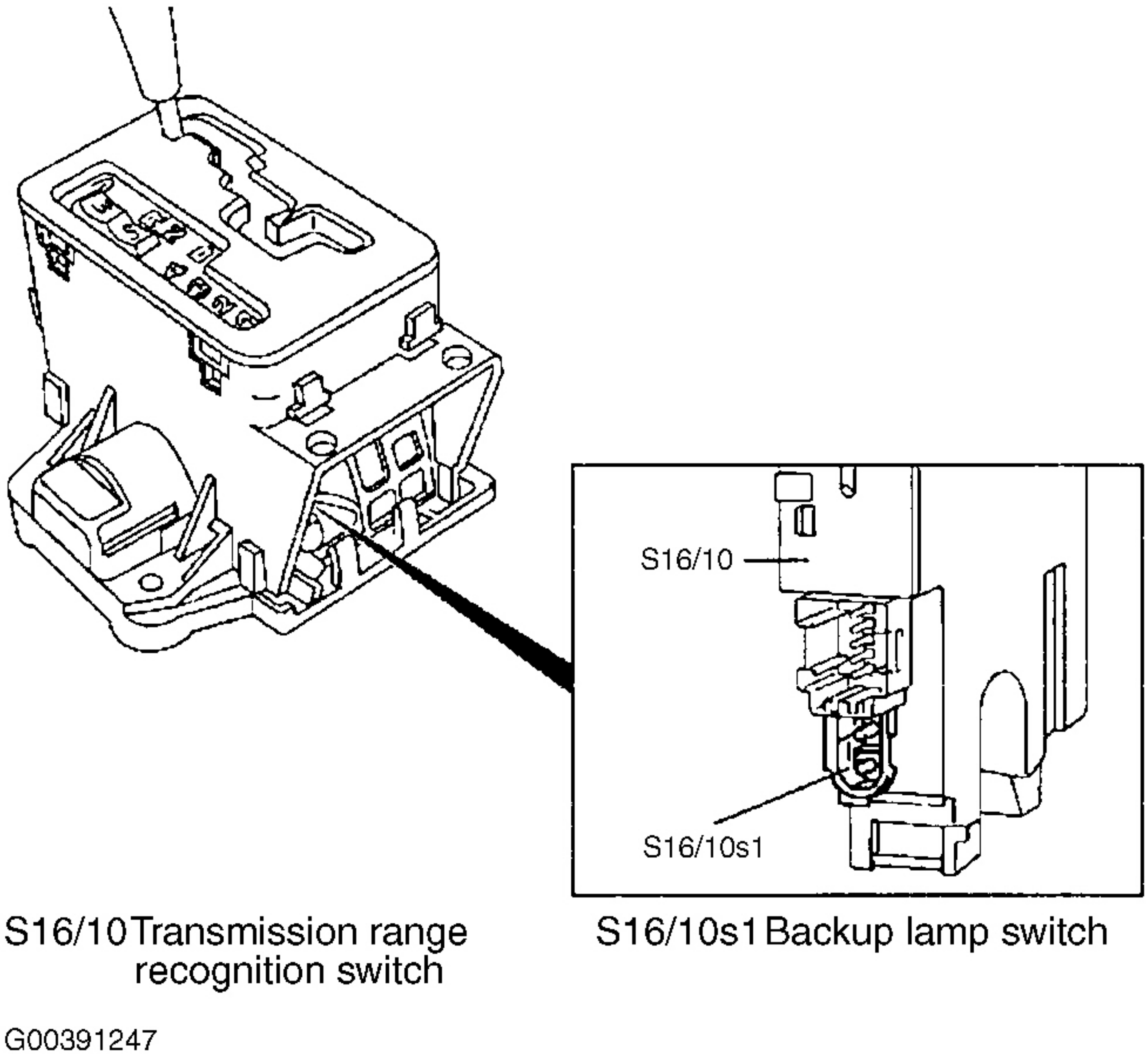


Fig. 27: Backup Lamp Switch
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Backup Lamp Switch, Location

The reverse lamp switch (S16/10s1) is integrated in the transmission range recognition switch (S16/10). See **Fig. 27**.

Backup Lamp Switch, Task

To switch on the backup lamp.

Backup Lamp Switch, Function

When reverse gear is engaged the reversing lamp is actuated direct via the reverse lamp switch (S16/10s1).

SURVEY OF SYSTEM COMPONENTS, AUTOMATIC TRANSMISSION, LOCATION/TASK/DESIGN/FUNCTION (WITH TOUCH SHIFT)

NOTE: Transmission With Touch Shift 722.6 In Model 163

Starter Lock-Out Contact, Location/Task/Design/Function

See STARTER LOCK-OUT CONTACT, LOCATION/TASK/DESIGN/FUNCTION.

Torque Converter, Location/Task/Design/Function

See TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION.

Wheel Speed Sensor, Location/Task/Function

See WHEEL SPEED SENSOR, LOCATION/TASK/FUNCTION.

Electronic Control Module, Location/Task/Design/Function

See ELECTRONIC CONTROL MODULE, LOCATION/TASK/DESIGN/FUNCTION.

Location/Task/Design/Function Of Freewheel

See LOCATION/TASK/DESIGN/FUNCTION OF FREEWHEEL.

Transmission Housing Breathing, Location/Task

See TRANSMISSION HOUSING BREATHING, LOCATION/TASK.

Kick-Down Switch, Location/Task/Design

See KICK-DOWN SWITCH, LOCATION/TASK/DESIGN.

Location/Task/Function Of Command Valve

See LOCATION/TASK/FUNCTION OF COMMAND VALVE.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Floor Shift, Location/Task/Design/Function

See **FLOOR SHIFT, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Parking Lock, Location/Task/Design/Function

See **PARK PAWL, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**.

Position Indicator, Location/Task/Design/Function

See **POSITION DISPLAY, LOCATION TASK**.

Location/Task/Design/Function Of PWM Solenoid Valve, Torque converter Lockup Clutch

See **LOCATION/TASK/DESIGN/FUNCTION OF PWM SOLENOID VALVE, TORQUE CONVERTER LOCKUP CLUTCH**.

Modulating Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **MODULATING PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Working Pressure Regulating Valve, Location/Task/Design/Function

See **WORKING PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Regulating Valve Pressure Regulating Valve, Location/Task/Function

See **REGULATING VALVE PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Regulating Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Shift Valve Pressure Regulating Valve, Location/Task/Design/Function

See **SHIFT VALVE PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Lubrication Pressure Regulating Valve, Location/Task/Design/Function

See **LUBRICATION PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Task/Design/Function

See **OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Torque Converter Lockup Clutch Regulating Valve, Location/Task/Function

See **TORQUE CONVERTER LOCKUP CLUTCH REGULATING VALVE, LOCATION/TASK/FUNCTION**.

R/P Lock, Location/Task/Design/Function

See **R/P LOCK, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Detent Mechanism, Location/Task/Design/Function

See **SHIFT DETENT MECHANISM, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Task/Design/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Task/Function

See **SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Float, Location/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

ETC Control Module, Location/Task

See **ETC CONTROL UNIT, LOCATION/TASK**.

Electronic Selector Lever Module Control Module, Location/Task/Design

See **ELECTRONIC SELECTOR LEVER MODULE CONTROL MODULE, LOCATION/TASK/DESIGN**.

Temperature Sensor, Location/Task/Design/Function

See **TEMPERATURE SENSOR, LOCATION/TASK/DESIGN/FUNCTION**.

Torque Converter Lock-Up Clutch, Location/Task/Design/Function

See **TORQUE CONVERTER LOCK-UP CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Automatic Transmission, Contents Function Description

See **AUTOMATIC TRANSMISSION, CONTENTS, FUNCTION DESCRIPTION**.

Starter Lock-Out Contact, Location/Task/Design/Function

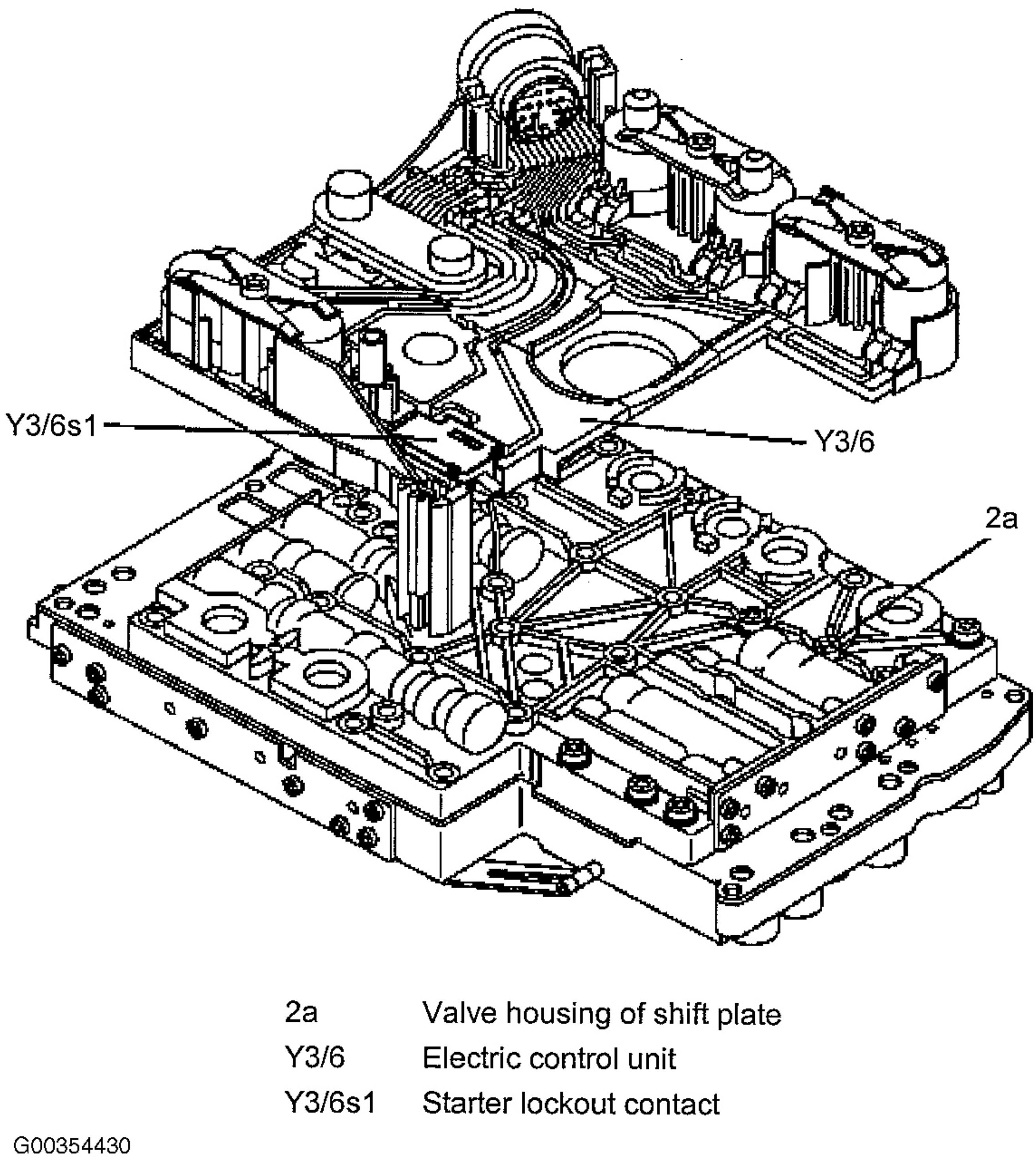


Fig. 28: Starter Lock-Out Contact, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Starter Lockout Contact, Location

The starter lockout contact (Y3/6sl) is located in the electrical control unit (Y3/6) and is permanently connected to the conductor track. See **Fig. 28**.

Starter Lockout Contact, Task

To recognize selector valve and selector lever position "P" and "N".

Starter Lockout Contact, Design

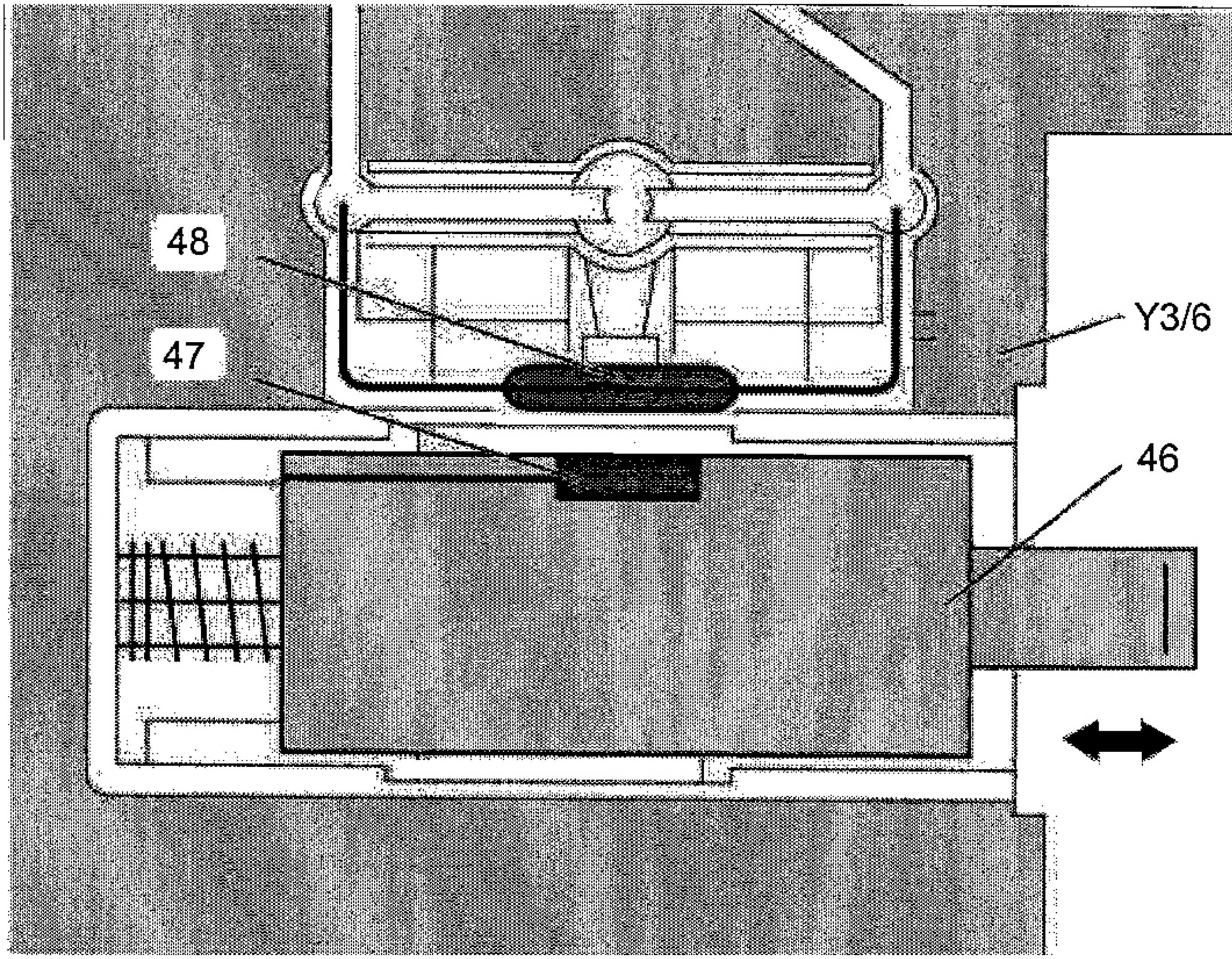
The starter lockout contact (Y3/6sl) consists of:

- A Plunger
- A Permanent Magnet
- A Reed Contact

Starter Lockout Contact, Function

See **STARTER LOCKOUT CONTACT, FUNCTION**.

Starter Lockout Contact, Function



46	Plunger
47	Permanent magnet
48	Dry-reed contact
Arrow	Direction of movement
Y3/6	Electric control unit

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Fig. 29: Starter Lockout Contact, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

In selector lever position "P" and "N" the starter lockout contact (Y3/6s1) is actuated by a cam track which is located on the detent plate. See **Fig. 29**.

The permanent magnet (47) is moved away from the dry-reed contact (48). The dry-reed contact (48) is opened. The ETC control module (N15/3) receives an electric signal. The circuit to the starter in the selector lever position "P" and "N" is closed.

Torque Converter, Location/Task/Design/Function

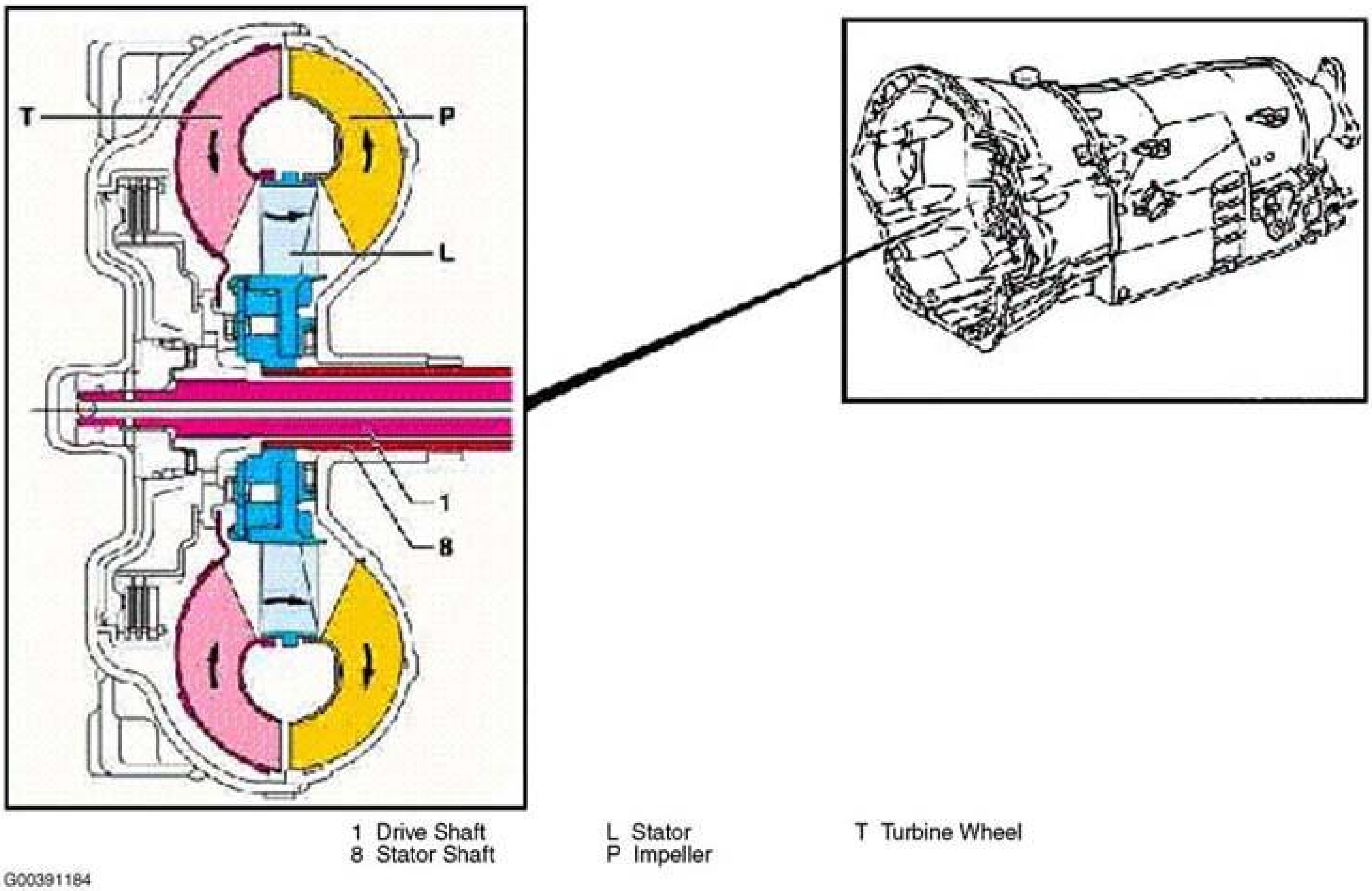


Fig. 30: Torque Converter, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Torque Converter, Location

The torque converter is rigidly bolted to the driver plate in the torque converter housing. See **Fig. 30**.

Torque Converter, Task

Reduces the power flow between the engine and the automatic transmission to a minimum when the

vehicle is stationary and the engine is idling, boosts the engine torque and provides infinitely variable engine speed and torque matching when moving off.

Torque Converter, Design

The impeller (P) is connected to the engine, the turbine wheel (T) is connected to the transmission input shaft.

The stator (L) is connected to the transmission housing via a freewheel and the stator shaft (8).

Torque Converter, Function

See **TORQUE CONVERTER, FUNCTION**.

Torque Converter, Function

Due to the effect of centrifugal force, the blades of the impeller (P) pump the oil outwards to the turbine wheel (T), causing it to rotate. See **Fig. 31**. The turbine wheel blades direct the oil onto the blades of the stator, which in turn push the oil back to the impeller (P) (arrow). This diversion at the stator (L), which is supported against the transmission housing via the freewheel, produces and increase in torque. At the maximum speed difference between the impeller and the turbine wheel (T), the torque conversion achieves its maximum value at a factor of 1.8 to 2.0, dropping to a torque ratio of 1:1 as the speeds converge. From this operating state onwards, also referred to as the coupling point, the stator (l) rotates with the impeller (P) and the turbine wheel (T). Efficiencies of up to approximately 98% are achieved in the coupling range.

The oil in the torque converter is constantly being replaced so that the heat produced in the operating phase can be dissipated via the transmission oil cooler.

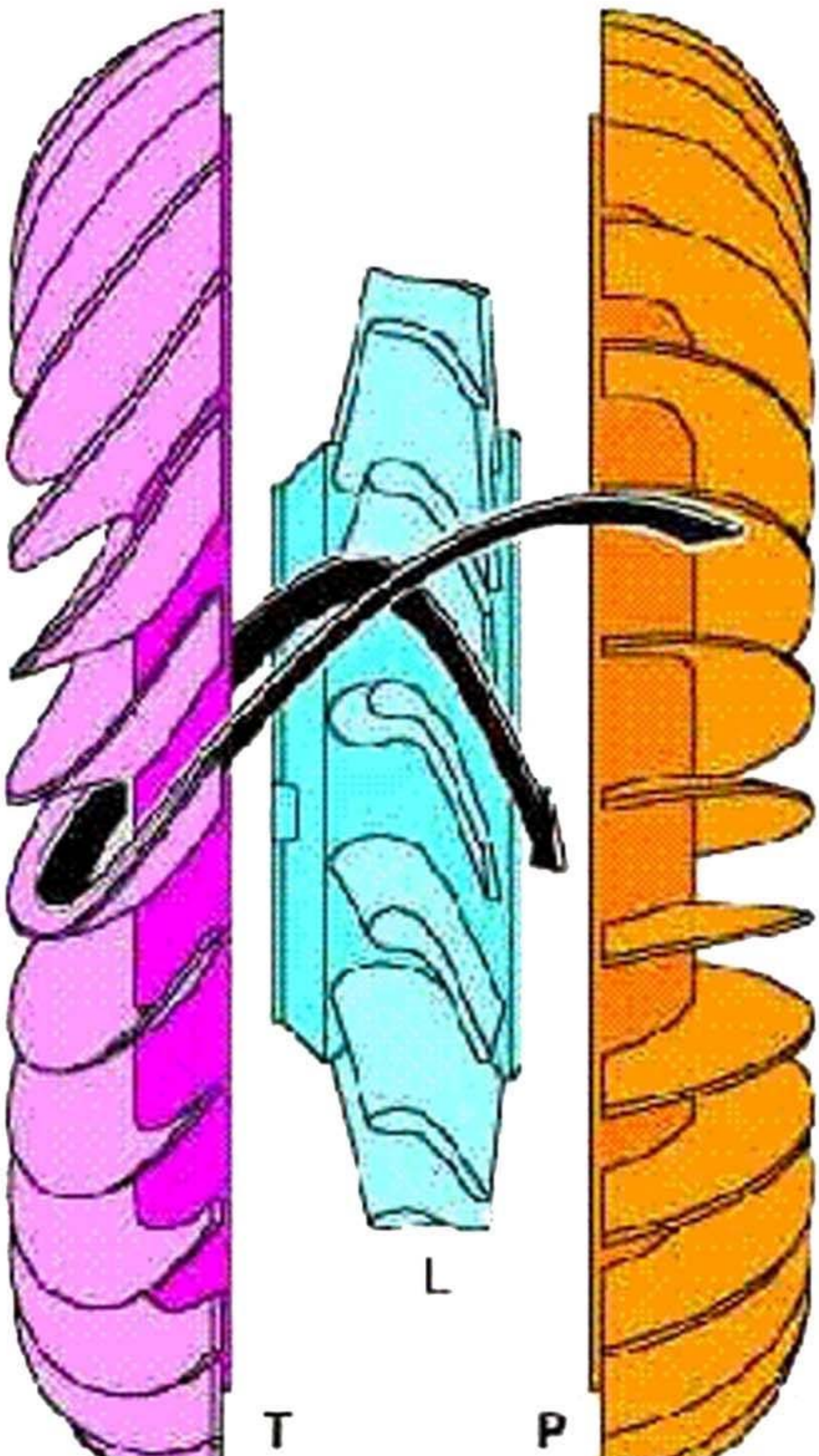

L
T
P

Fig. 31: Torque Converter, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Wheel Speed Sensor, Location/Task/Function

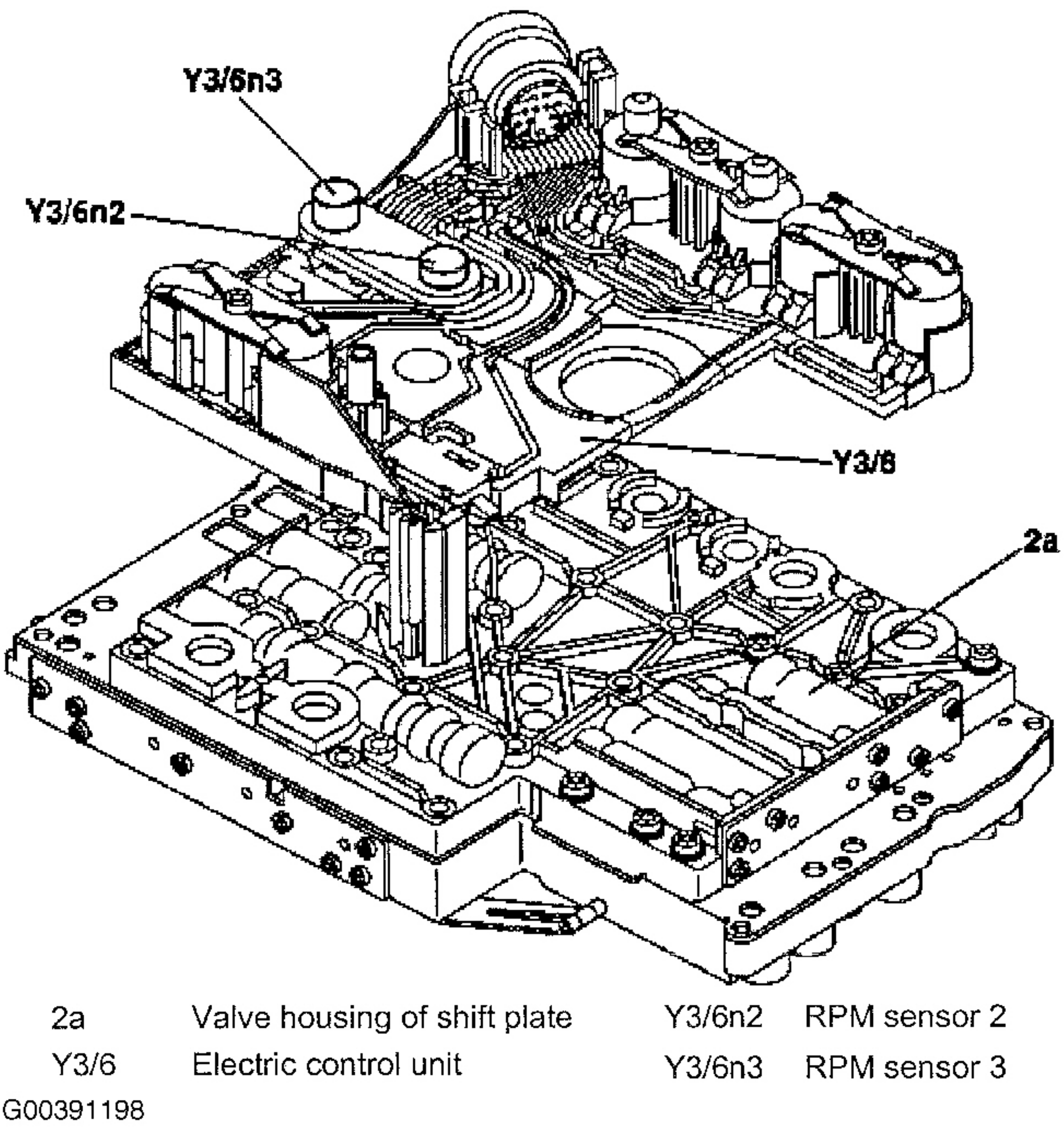


Fig. 32: Wheel Speed Sensor, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Wheel Speed Sensor, Location

RPM sensors 2 and 3 (Y3/6n2 and Y3/6n3) are permanently connected with the supporting body of the electrical control unit (Y3/6) via contact tongues. See **Fig. 32**.

Wheel Speed Sensor,

The signals from the RPM sensors 2 3 (Y3/6n2, Y3/6n3) are recorded in the ETC control module (N15/3) together with the wheel and engine speeds and other information, and are the input signals for the electronic control system.

Wheel Speed Sensor, Function

See **SPEED SENSOR, FUNCTION**.

Speed Sensor, Function

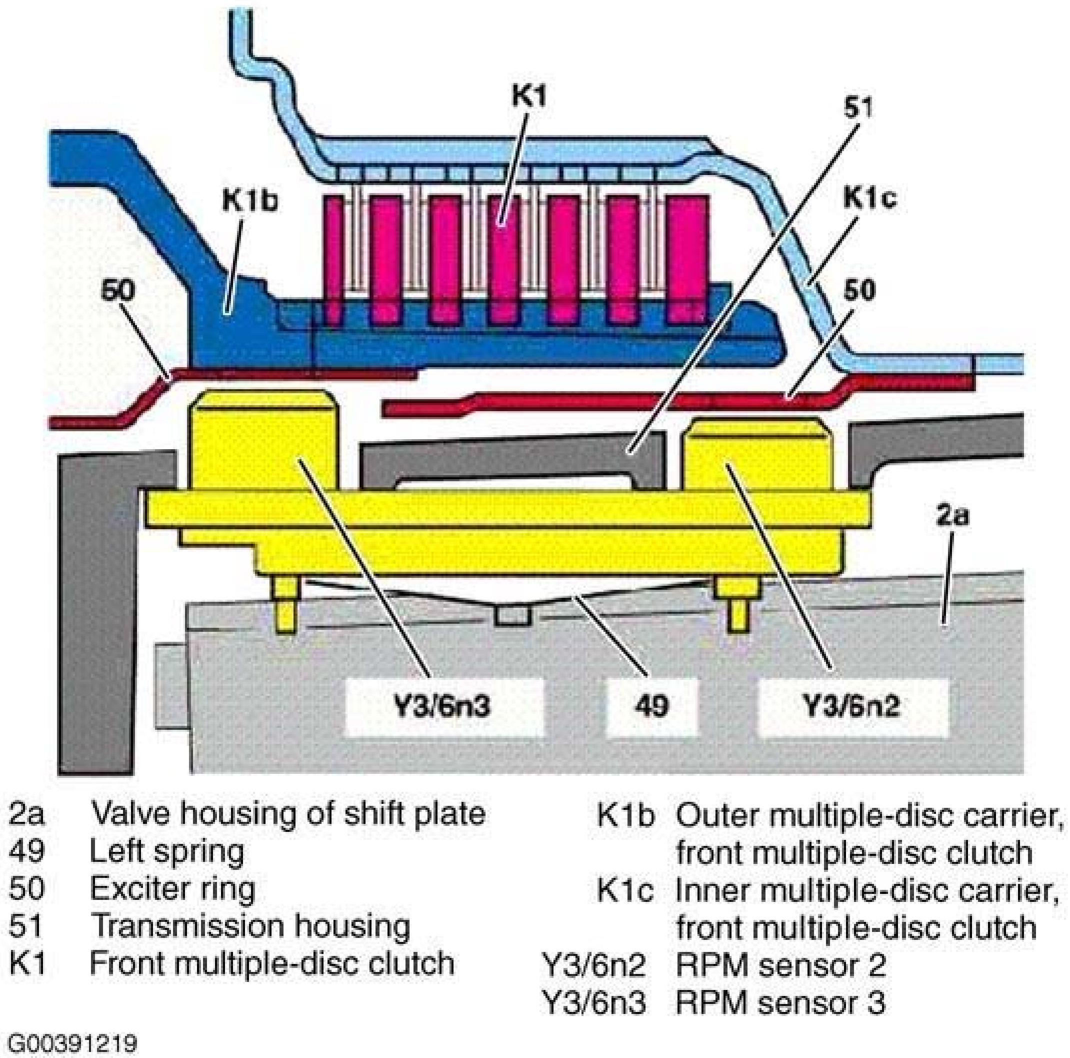


Fig. 33: Speed Sensor, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The RPM sensors are pressed against the transmission housing (51) by a spring (49) which is held against the valve housing of the shift plate (2a). See **Fig. 33**. This ensures a defined distance between the RPM sensors and the exciter ring (50). RPM sensor 2 (Y3/6yn2) records the speed of the front sun gear via the outer multiple-disc carrier of the front multiple-disc clutch (K1b) and RPM sensor 3 (Y3/6yn3) records the speed of the front planetary gear carrier via the inner multiple-disc carrier of the front multiple-disc clutch (K1c).

Electronic Control Module, Location/Task/Design/Function

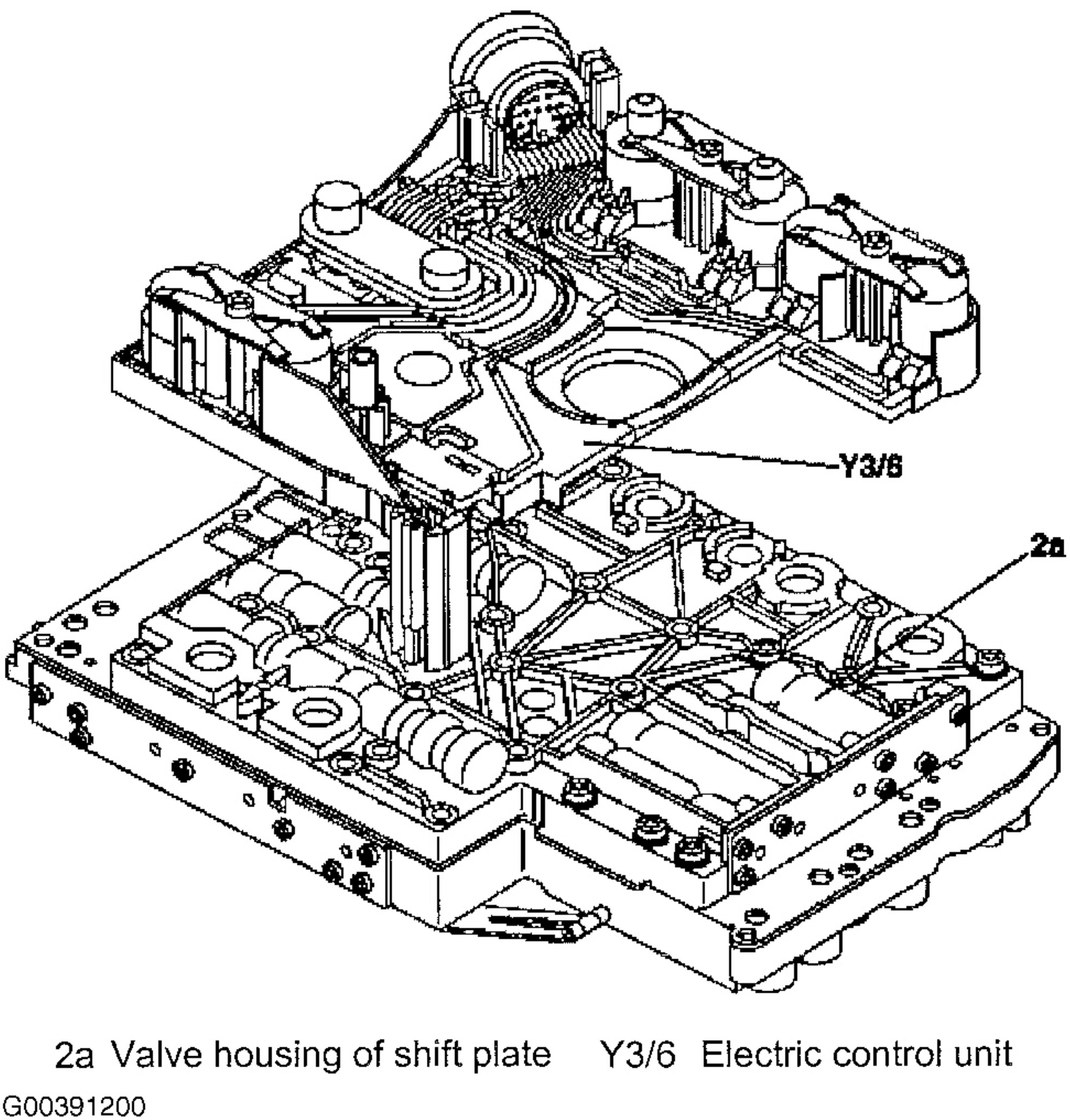


Fig. 34: Electronic Control Module, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Electronic Control Module, Location

Bolted onto the valve housing of shift plate (2a). See **Fig. 34**.

Electronic Control Module, Task

To receive various input signals and to convert the control module information into hydraulic functions.

Electronic Control Module, Design

See **ELECTRONIC CONTROL MODULE, DESIGN**.

Electronic Control Module, Function

See **ELECTRONIC CONTROL MODULE, FUNCTION**.

Electronic Control Module, Design

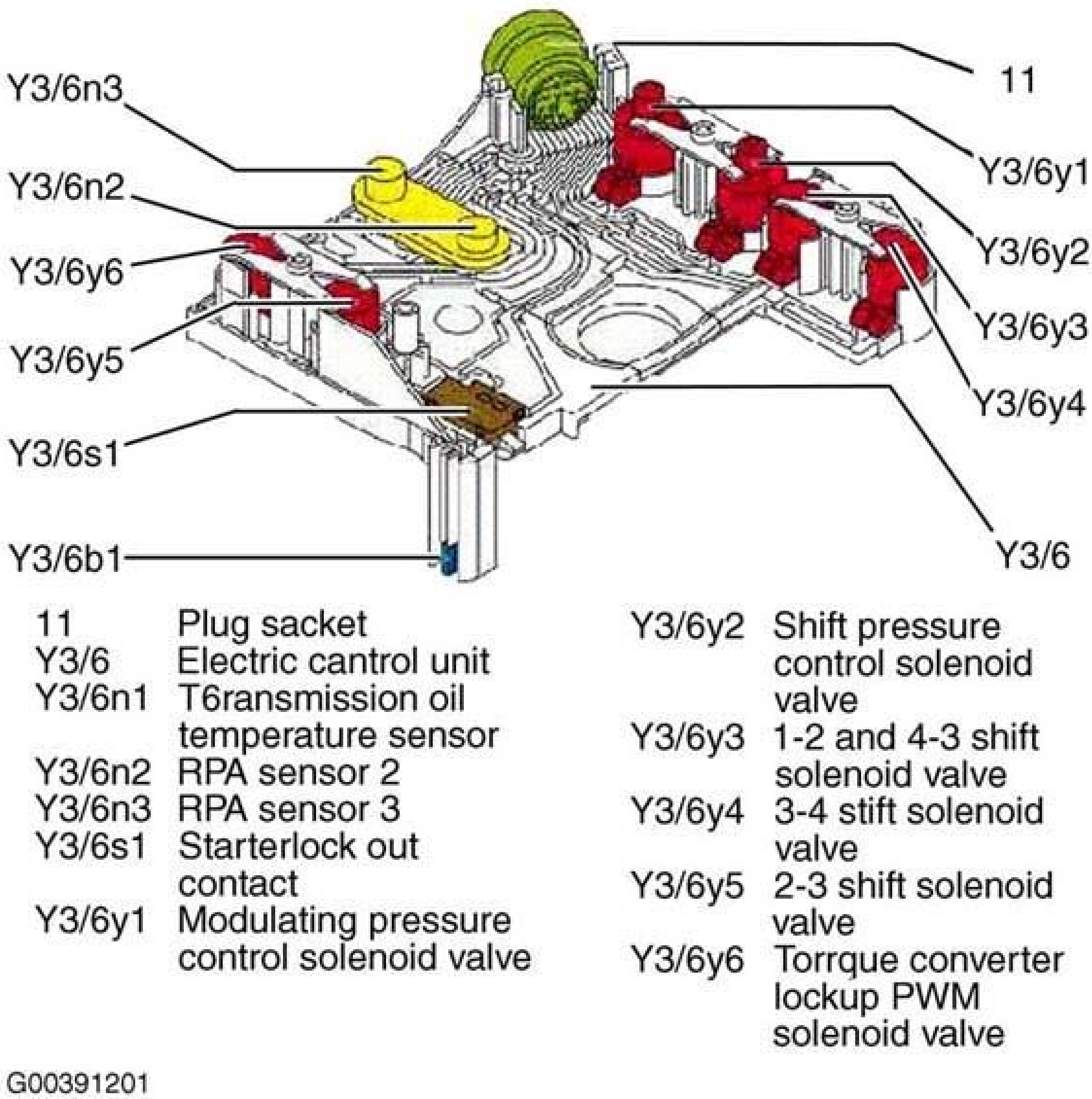


Fig. 35: Electronic Control Module, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

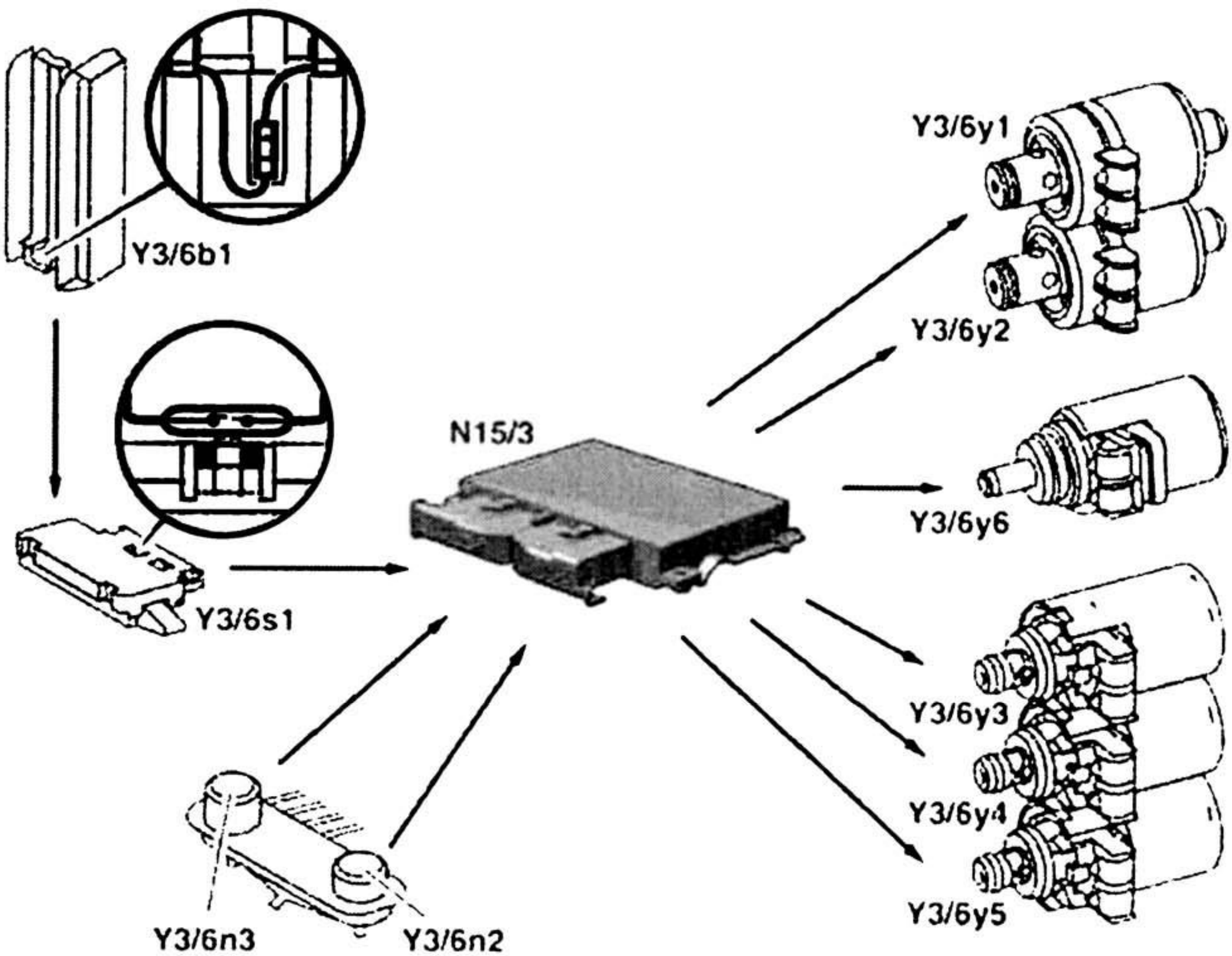
Structure

The electrical control unit (Y3/6) consists of a supporting body made from plastic, in which the electrical components, RPM sensors 2 and 3 (Y3/6n2, Y3/6n3), the regulating solenoid valves (Y3/6y1, Y3/6y2), the shift solenoid valves (Y3/6y6), the starter lockout contact (Y3/6s1) and transmission oil temperature sensor (Y3/6b1) are combined. See **Fig. 35**. Conductor tracks integrated into the shell connect the electric components to a plug connection (11).

The connection to the wiring harness on the vehicle side and the ETC control module (N15/3) is made via this 13-pin connector (11) with a bayonet lock.

With the exception of the solenoid valves, all other electric components are fixed to the conductor tracks.

Electronic Control Module, Function



N15/3	ETC control module
Y3/6b1	Transmission oil temperature sensor
Y3/6n2	RPM sensor 2
Y3/6n3	RPM sensor 3
Y3/6s1	Starter lockout contact
Y3/6y1	Modulating pressure control solenoid valve
Y3/6y2	Shift pressure control solenoid valve
Y3/6y3	1-2 and 4-5 shift solenoid valve
Y3/6y4	3-4 shift solenoid valve
Y3/6y5	2-3 shift solenoid valve
Y3/6y6	Torque converter lockup PWM solenoid valve

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Fig. 36: Electronic Control Module, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

Signals from the ETC control module (N15/3) are converted into hydraulic functions in the electric valve control unit (Y3/6). The RPM sensors (Y3/6n2, Y3/6n3), the starter lockout contact (Y3/6s1) and the transmission oil temperature sensor (Y3/6b1) of the electrical control unit (Y3/6) supply the ETC control module (N15/3) with input signals. The solenoid valves are controlled by the ETC control module (N15/3) and trigger the hydraulic functions. See **Fig. 36**.

Location/Task/Design/Function Of Freewheel

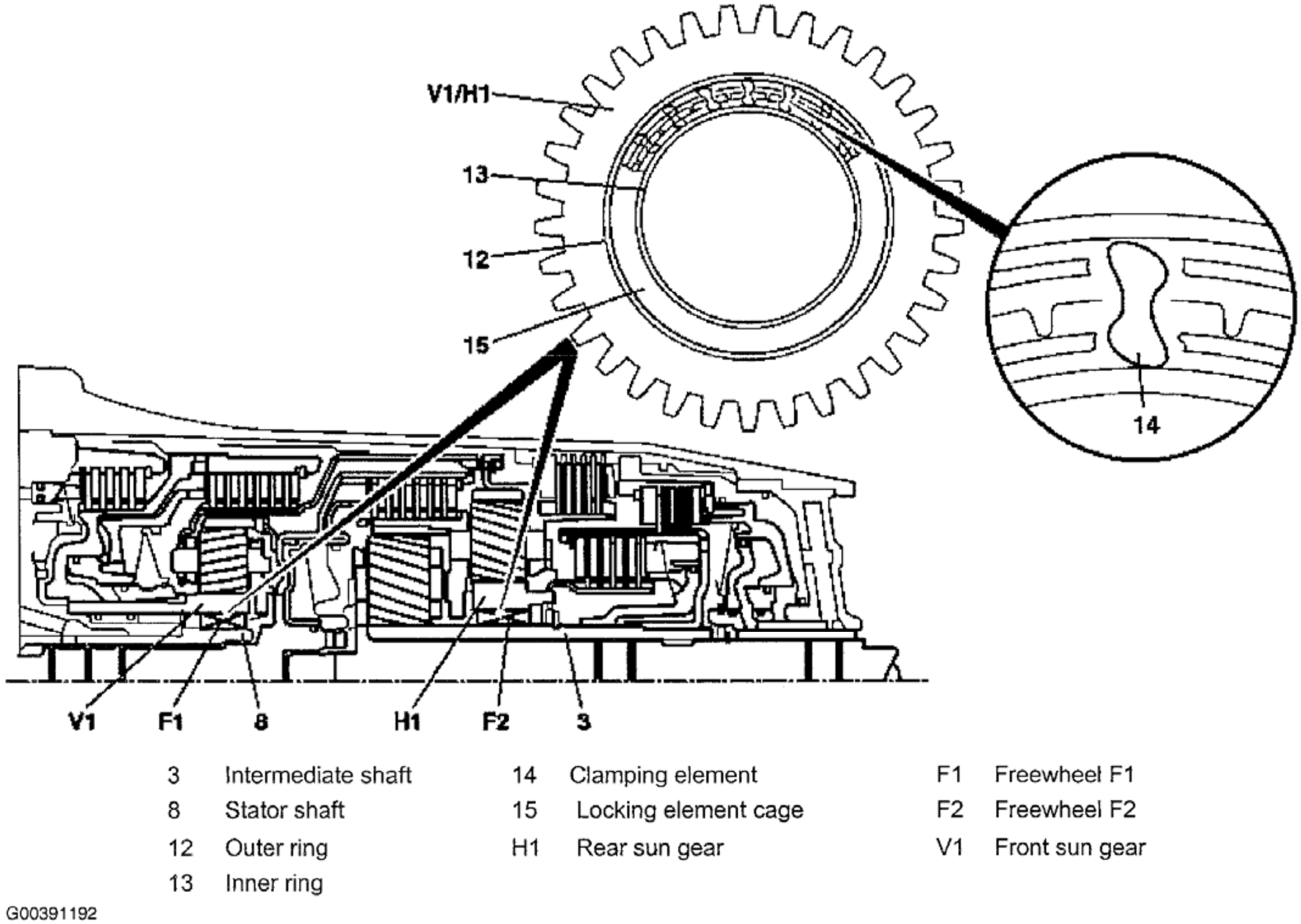


Fig. 37: Function Of Freewheel
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Freewheel Location

In the front planetary gear set a freewheel (F1, F2) is installed between the front sun gear (V1) and the stator shaft (8) and in the rear planetary gearset between the rear sun gear (H1) and the intermediate shaft (3). See **Fig. 37**.

Freewheel Task

Optimizes individual gearshifts. Support of the individual elements of a planetary gear set against each other or against the transmission housing in one direction of rotation in order to permit torque transmission.

Freewheel Design

The freewheels (F1, F2) consist of an outer race (12), an inner race (13), a number of clamping bodies (14) and a clamping body cage (15).

Freewheel Function

See **FREEWHEEL, FUNCTION**.

Freewheel, Function

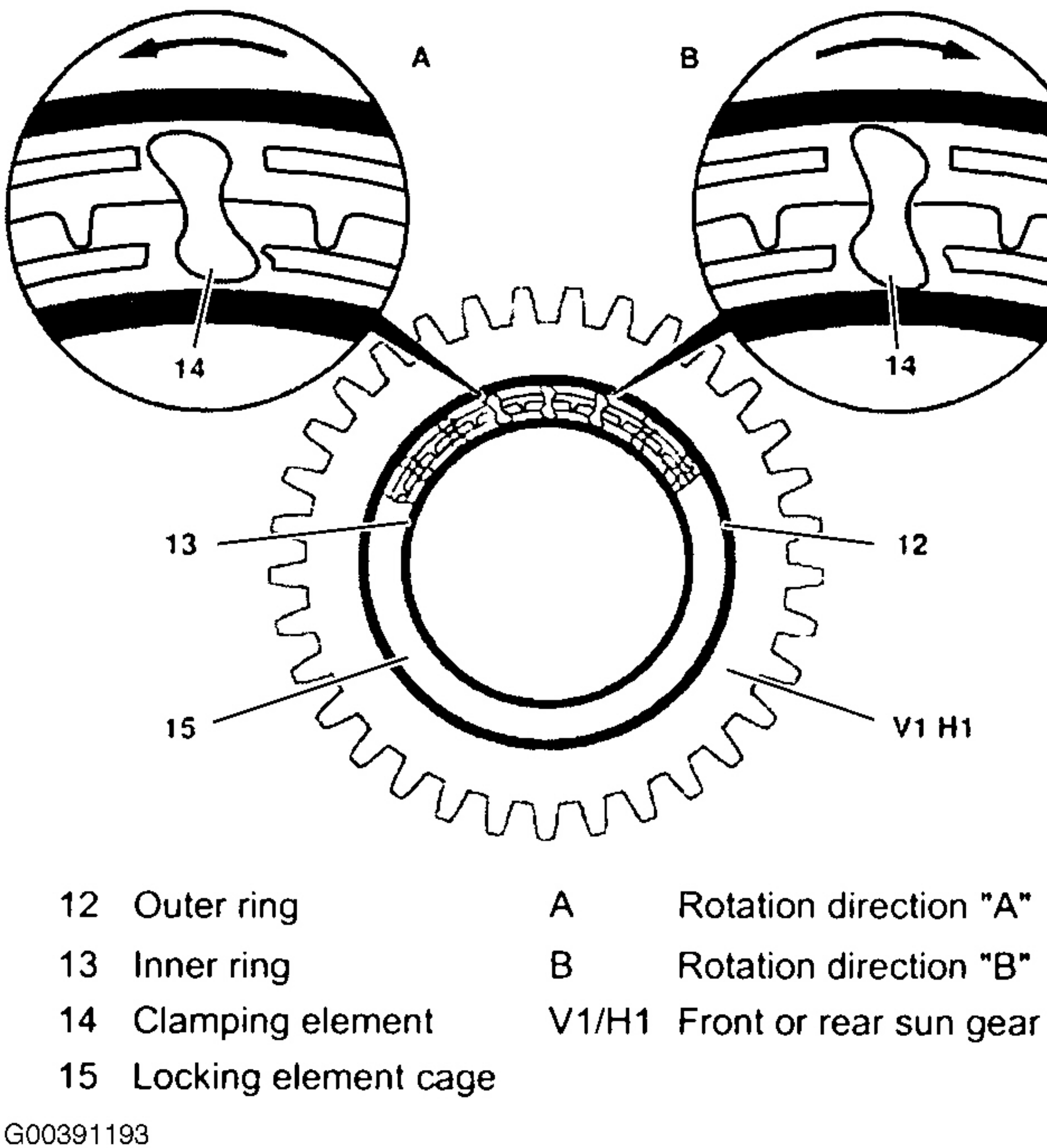


Fig. 38: Freewheel Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - If the inner race (13) of the freewheel is locked and the outer race (12) turns in direction "A" , the locking elements (14) adopt a diagonal position on account of their special contours, allowing the freewheel function. See **Fig. 38**. The outer race (12) slides over the locking elements (14) with negligible friction. If the rotation of the outer race (12) changes to direction "B", the locking elements (14) stand up and lock the outer and inner races (12, 13) together.

Transmission Housing Breathing, Location/Task

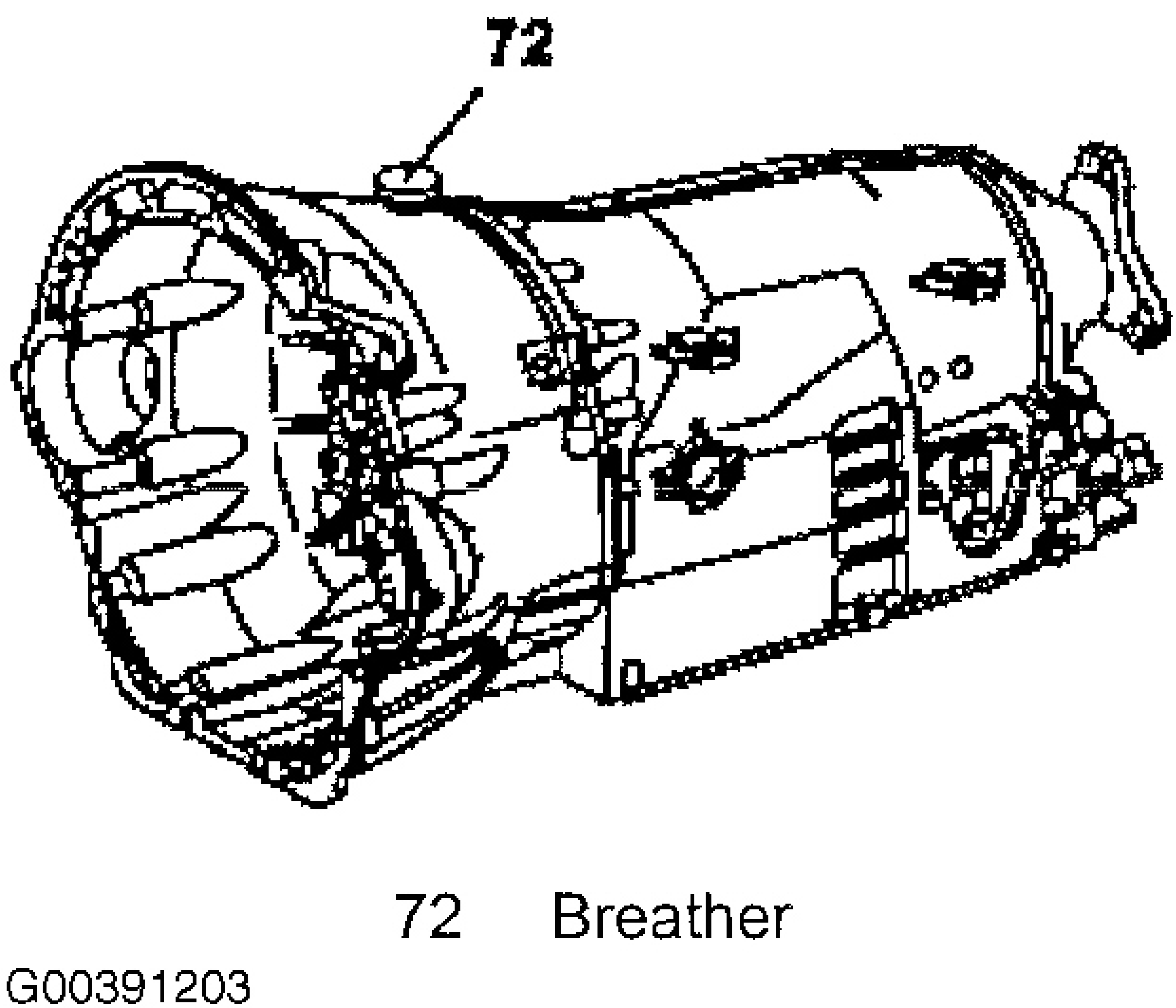


Fig. 39: Transmission Housing Breather, Location/Task
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Transmission Housing Breather, Location

The inside of the transmission and the breather (72) are connected by a channel which is cast into the torque converter casing. See **Fig. 39**.

Transmission Housing Breather, Task

The transmission housing vent compensated the pressure in the transmission housing if temperature-related volume changes in the transmission oil and air occur.

Kick-Down Switch, Location/Task/Design

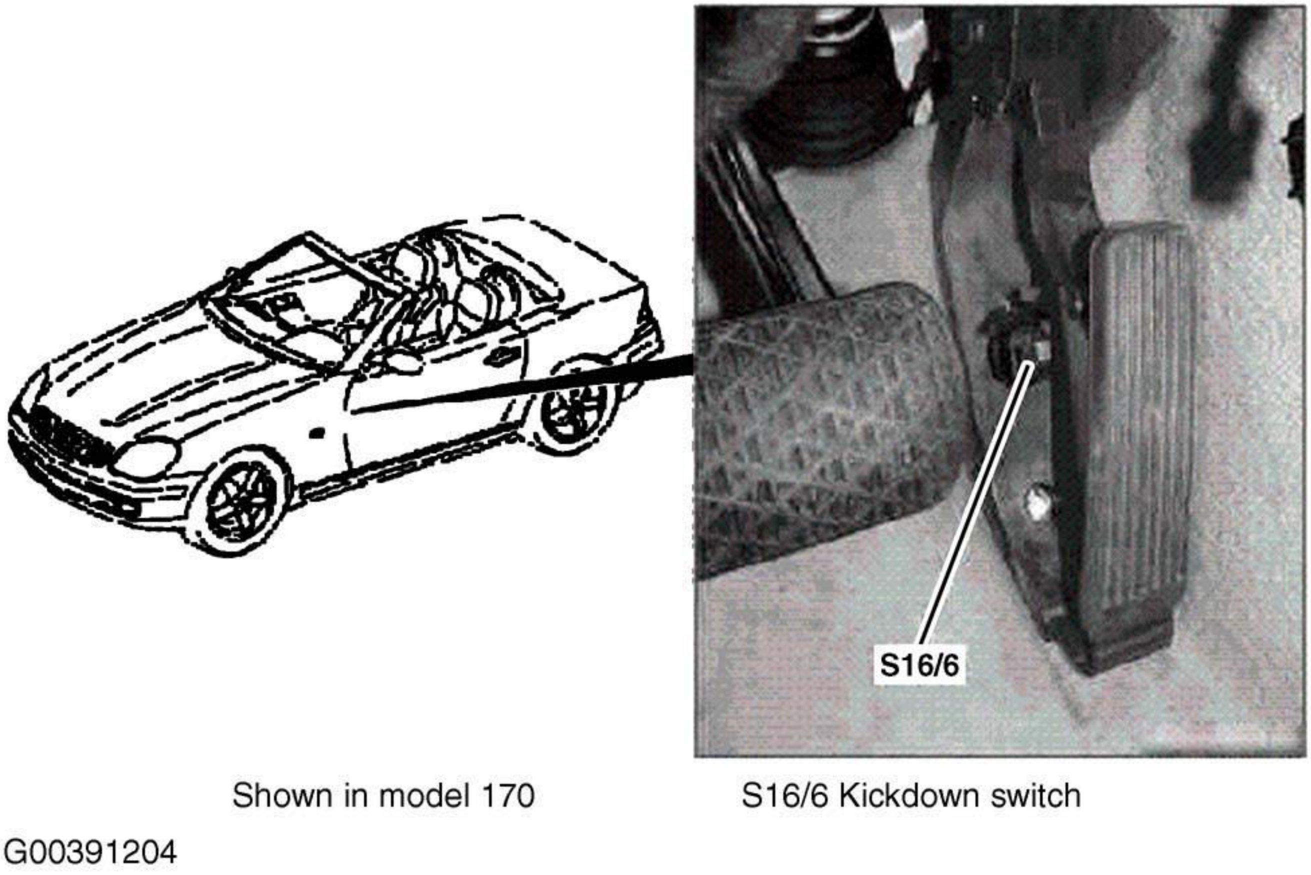


Fig. 40: Kickdown Switch, Location/Task/Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Kick-Down Switch, Position

The kickdown switch (S16/6) is located in the footwell, integrated into the electric accelerator pedal. See **Fig. 40**.

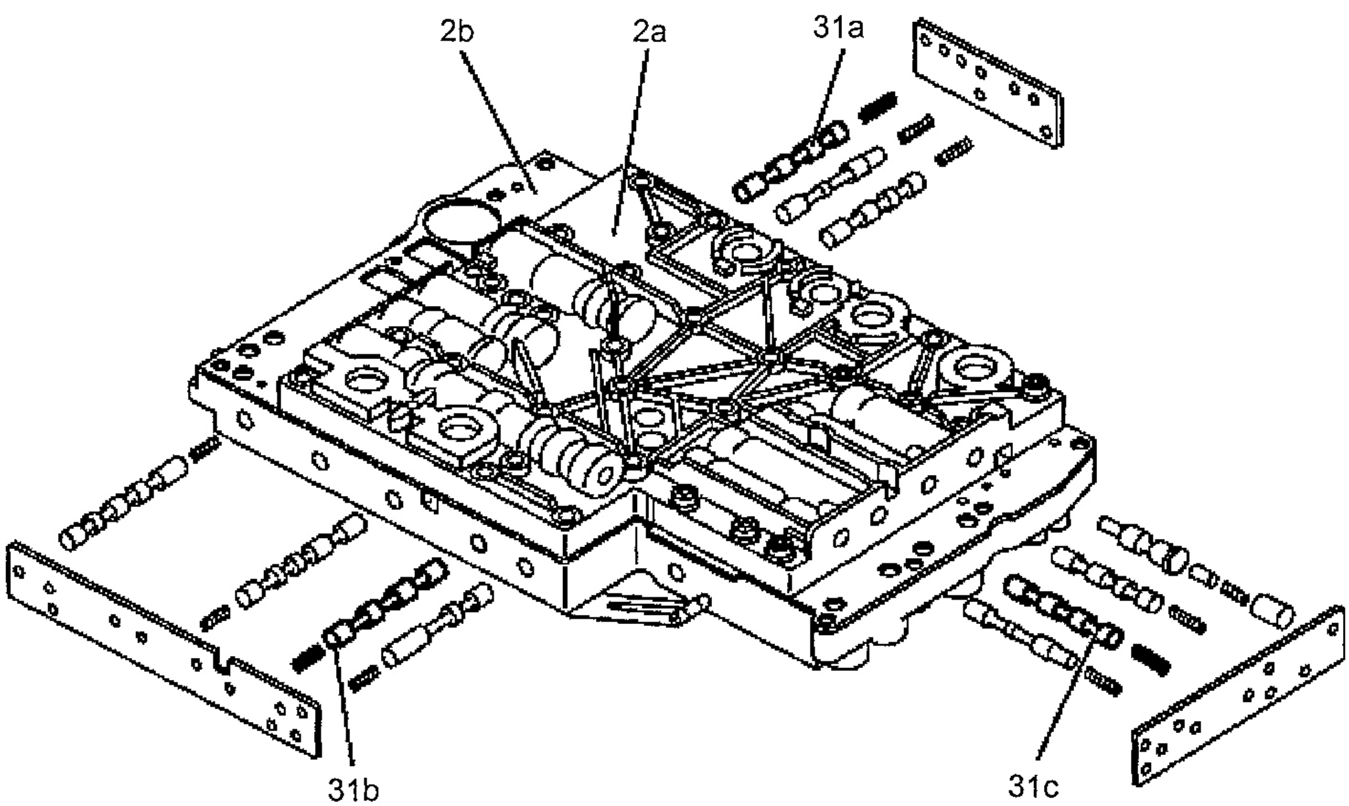
Kick-Down Switch, Task

Influencing the shift program of the electronic transmission control.

Kick-Down Switch, Design

The kickdown switch (S16/6) consists of a spring-tensioned electrical switch contact.

Location/Task/Function Of Command Valve



2a	Valve housing of shift plate
2b	Valve housing of shift plate
31a	1-2 / 4-5 command valve
31b	2-3 command valve
31c	3-4 command valve

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Fig. 41: Location/Task/Function of Command Valve
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Command Valve, Location

Each shift group possesses one command valve. The 1-2/4-5 command valves (31a) and 2-3 (31b) are installed in the valve housing of the shift plate (2b), the 3-4 command valve (31c) is installed in the valve housing of the shift plate (2a). See **Fig. 41**.

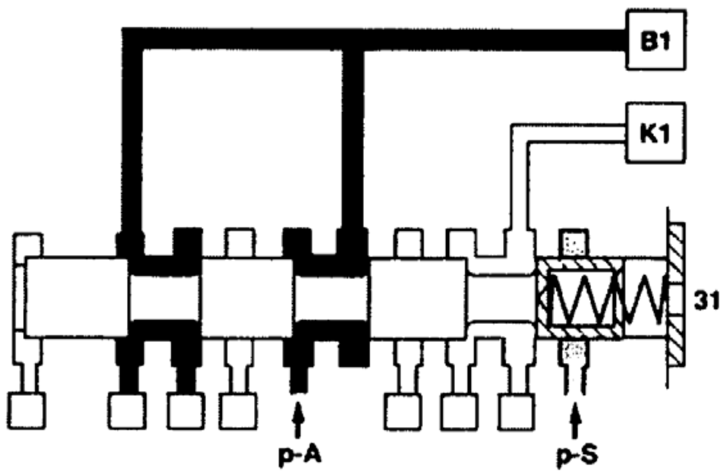
Command Valve, Task

The command valves switch the shift groups from the stationary phase into the shift phase and back again.

Command Valve, Function

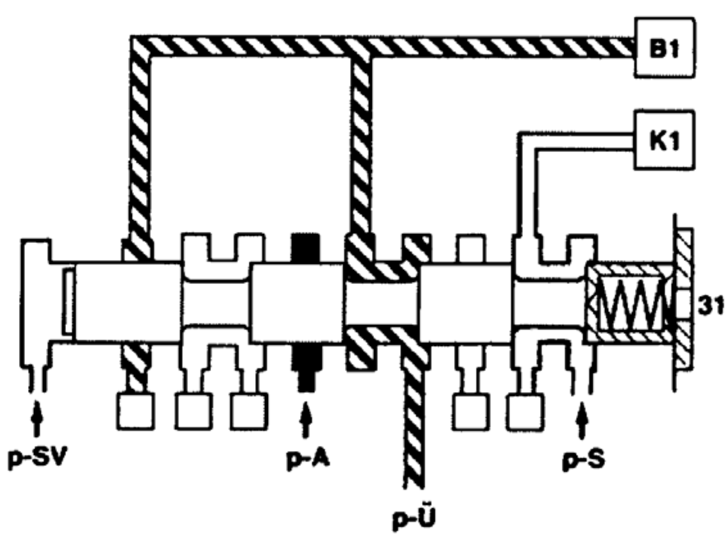
See **LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Command Valve, Function



1-2/4-5 command valve shown
Stationary phase (B1 engaged, K1 disengaged)

31 Command valve,
B1 Front multiple-disc brake
K1 Front multiple-disc clutch
p-A Working pressure
p-S Shift pressure



1-2/4-5 command valve shown
Shift phase (B1 disengaging, K1 engaging)

31 Command valve,
B1 Front multiple-disc brake
K1 Front multiple-disc clutch
p-A Working pressure

Fig. 42: Command Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

When the end face is unpressurized (stationary phase), the working pressure is directed to the actuated shift element. If the end face of the command valve (31) is subjected to shift valve pressure (p-SV) (shift phase), then the shift pressure (p-S) is switched to the engaging element and the overlap pressure (p-U) is switched tot he disengaging element. See **Fig. 42**.

Multiple-Disc Brake, Location/Task/Design/Function

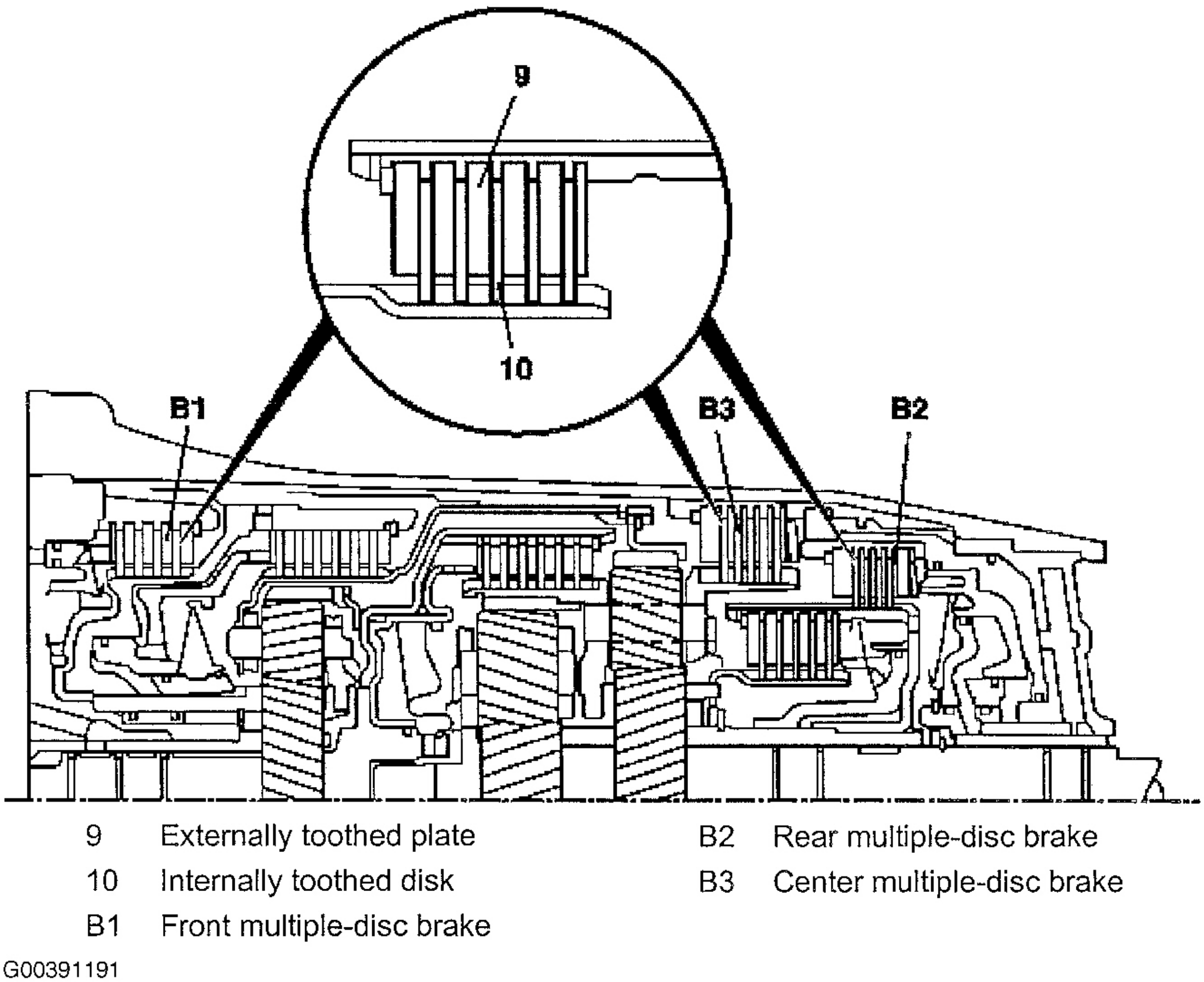


Fig. 43: Multiple-Disc Brake

Multiple-Disc Brake, Location

Three multiple-disc brakes arranged as the front, center and rear multiple-disc brake (B1, B3, B2) are located in the planetary gear sets in the transmission housing. See **Fig. 43**.

Multiple-Disc Brake, Task

Brace the ring gear, sun gear or planet carrier of a planetary gear set against the transmission housing in order to transmit the drive torque.

Multiple-Disc Brake, Design

A multiple-disc brake consists of a number of internally toothed discs (10) on an internally toothed disc carrier and externally toothed discs (9) on an externally toothed disc carrier, which is rigidly connected to the transmission housing.

Multiple-Disc Brake, Function

See **MULTIPLE-DISC BRAKE, FUNCTION**.

Multiple-Disc Brake, Function

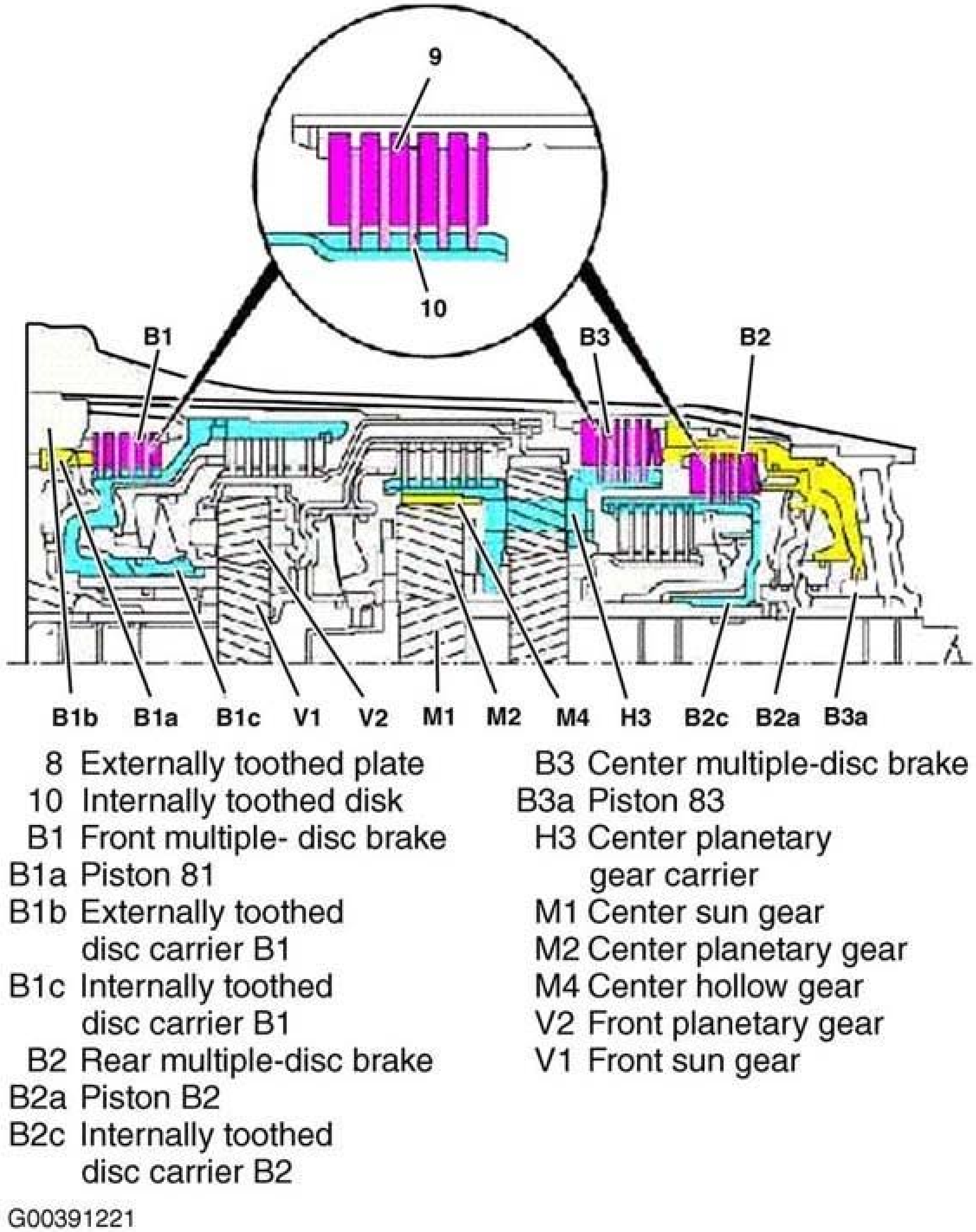


Fig. 44: Mulitple-Disc Brake, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

If the piston (B1a) on multiple-disc brake B1 is subjected to oil pressure, it presses the internal and external discs of the disc set together. See **Fig. 44**. The front sun gear (v1) on the housing is locked via the internal multiple-disc carrier (B1c). the front planetary gears (V2) roll on the front sun gear (V1).

If the rear multiple-disc brake (B2) is engaged via the piston (B2a), then this presses the disc set together. The center sun gear (M1) is locked against the housing via the internal multiple-disc carrier (B2c). The center planetary gears (m2) roll on the center sun gear (M1).

If the center multiple disc brake (B3) is engaged via the piston (B3a), then the rear planetary gear carrier (H3) and the center hollow gear (M4) are locked. When the center multiple-disc brake (B3) is engaged the direction of rotation reverses.

Multi-Plate Clutch, Location/Task/Design/Function

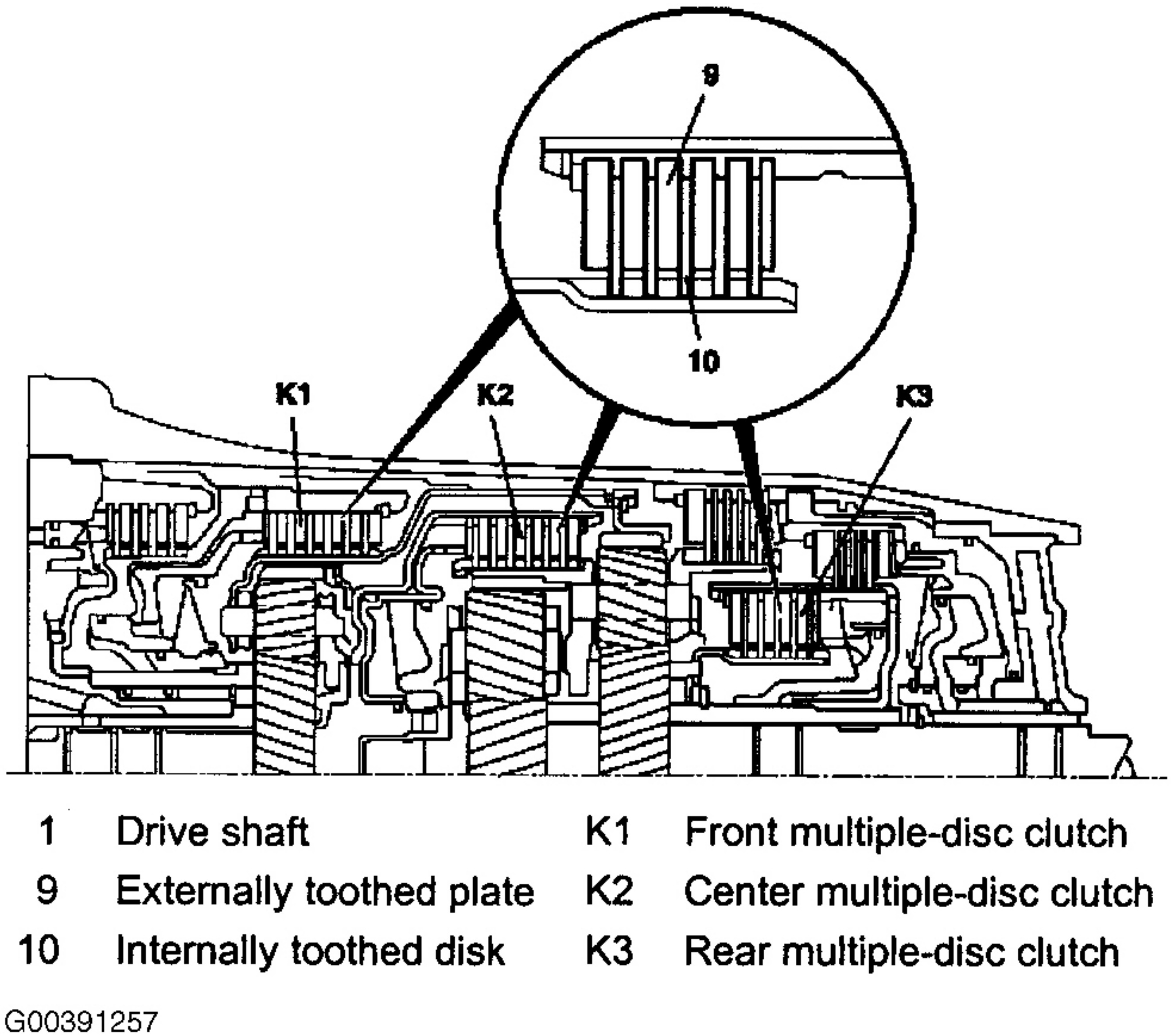


Fig. 45: Identifying Multi-Plate Clutch Location
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Multi-Plate Clutch, Location

Three multi-plate clutches, the front, middle and rear multi-plate clutches K1, K2, and K3, are located in the planetary gear sets in the transmission housing. See **Fig. 45**.

Multi-Plate Clutch, Task

Produces a non-positive locking connection between two elements of a planetary gear set or between one element from each of two planetary gear sets in order to transmit the drive torque.

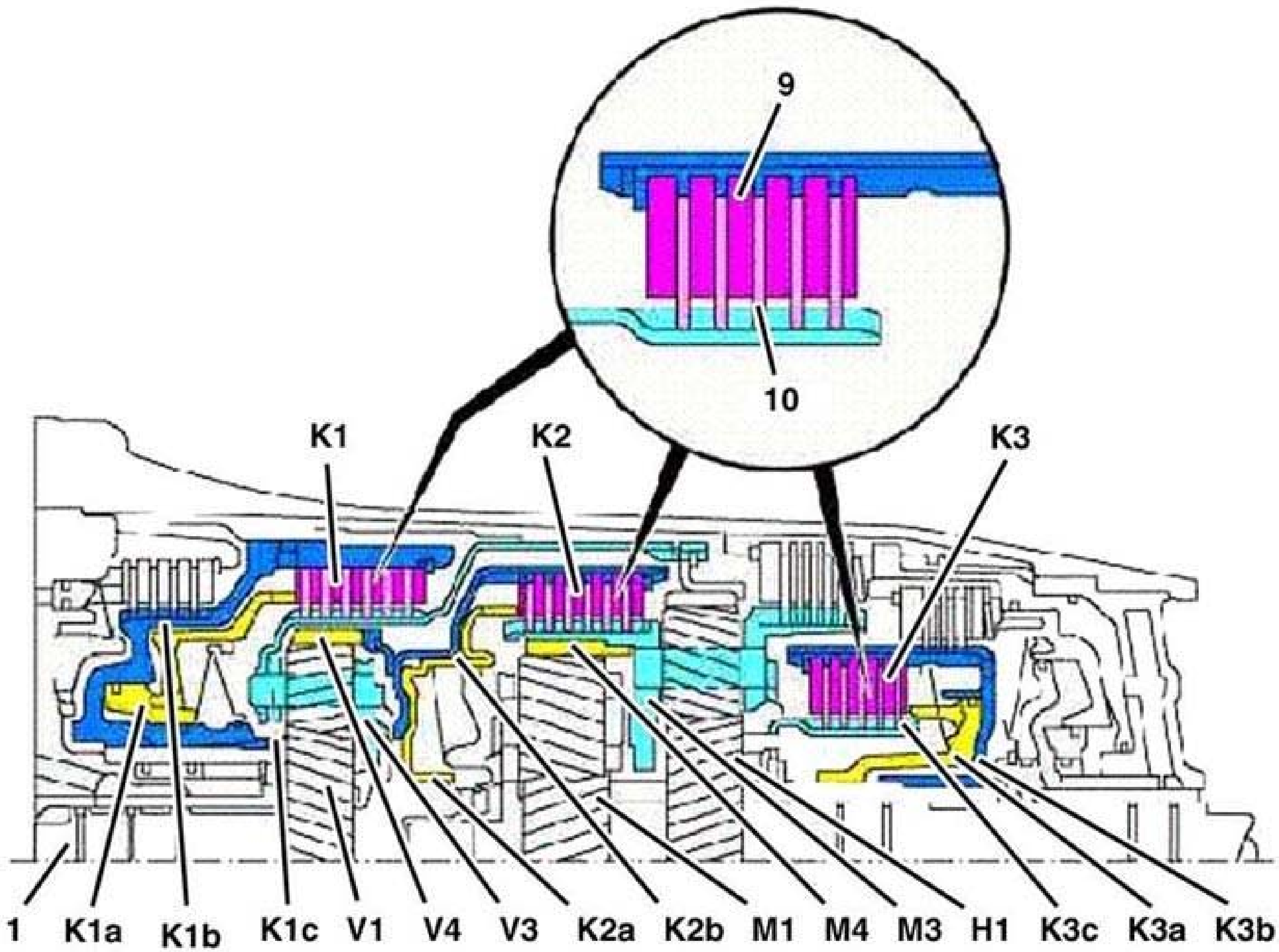
Multi-Plate Clutch, Design

A multi-plate clutch consists of a number of internally toothed discs (10) on an internally toothed disc carrier and externally toothed discs (9) on an externally toothed disc carrier.

Multi-Plate Clutch, Function

See **MULTI-PLATE CLUTCH, FUNCTION**.

Multi-Plate Clutch, Function



1 Drive shaft
9 Externally toothed plate
10 Internally toothed disk
H1 Rear sun gear
K1 Front multiple-disc clutch
K1a Piston K1
K1b Externally toothed disc carrier K1
K1c Internally toothed disc carrier K1
K2 Center multiple-disc

K3 Rear multiple-disc clutch
K3a Piston K3
K3b Externally toothed disc carrier K3
K3c Internally toothed disc carrier K3
M1 Center sun gear
M3 Center planetary gear carrier
M4 Center hollow gear
V1 Front sun gear

Fig. 46: Multi-Disc Clutch, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

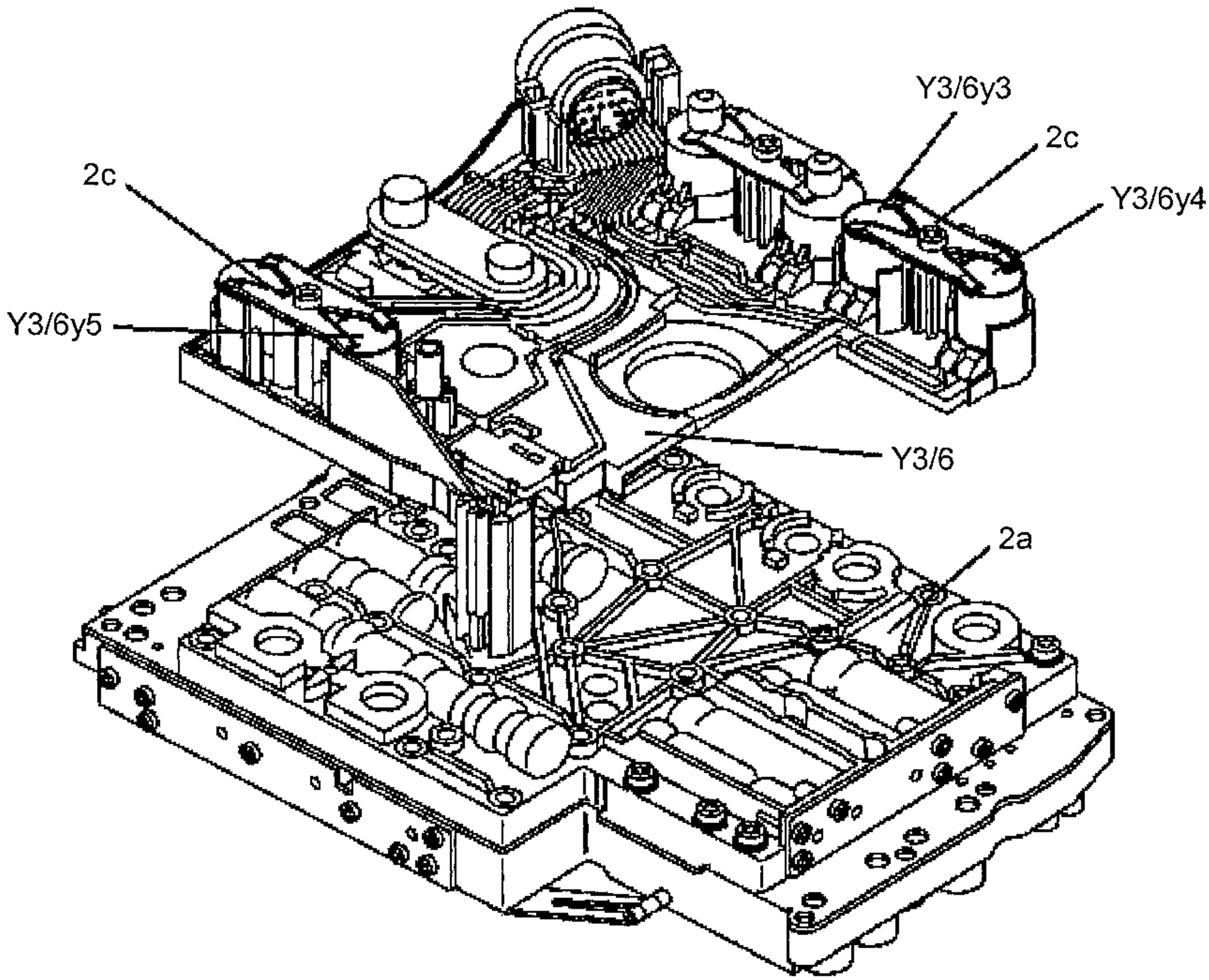
Front Multiple-Disc Clutch (K1) - If the piston (K1a) on the front multiple-disc clutch (k1) is subjected to oil pressure, it presses the internal and external discs of the disc set together. See **Fig. 46**.

The front sun gear (V1) is connected to the front planetary gear carrier (V3) via the external multiple-disc carrier (K1b) and the internal multiple-disc carrier (k1b) and the internal multiple-disc carrier (K1c). The front planetary gear set is thus locked and turns as a closed unit.

Center Multiple-Disc Clutch (K2) - If the center multiple-disc clutch (K2) is engaged via the piston (K2a), the piston compresses the disc set Via the internal multiple-disc carrier (K2b) and the center planetary gear carrier (M3) on which the internal discs are seated, the front hollow gear (v4) of the front planetary gear set is connected to the center hollow gear (M4) of the center planetary gear set. The front hollow gear (V4) and the center hollow gear (M4) move at the same speed as the drive shaft (1).

Rear Multiple-Disc Clutch (K3) - If the rear multiple-disc clutch (K3) is engaged via the piston (K3a), then this compresses the disc set. The center sun gear (M1) of the center planetary gear set is connected to the rear sun gear (H1) of the rear planetary gear carrier via the external multiple-disc carrier (K3b) and internal multiple-disc carrier (K3c). The center sun gear (M1) and the rear sun gear (H1) move at the same speed.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function



2a	Valve housing of shift plate
2c	Left spring
Y3/6	Electric control unit
Y3/6y3	1-2 and 4-5 shift solenoid valve
Y3/6y4	3-4 shift solenoid valve
Y3/6y5	2-3 shift solenoid valve

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Fig. 47: Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

Upshift/Downshift Solenoid Valve, Location

In the shell of the electric control unit and pressed against the shift plate with a spring. See **Fig. 47**.

Upshift/Downshift Solenoid Valve, Task

The shift solenoid valves (Y3/6y3, Y3/6y4, Y3/6y5) introduce the sequence of upshifts and downshifts in the shift plate.

Upshift/Downshift Solenoid Valve, Design

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, DESIGN**.

Upshift/Downshift Solenoid Valve, Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, FUNCTION**.

Upshift/Downshift Solenoid Valve, Design

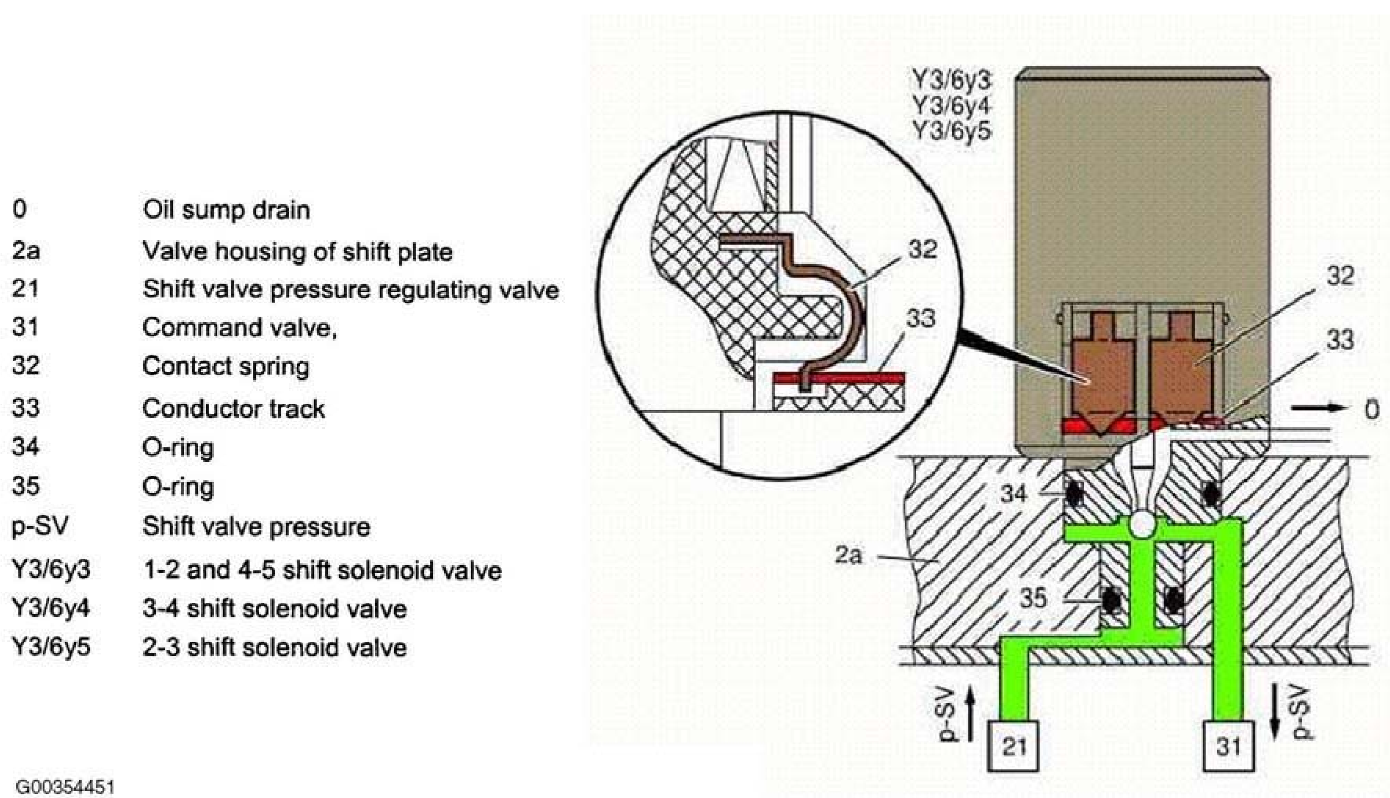
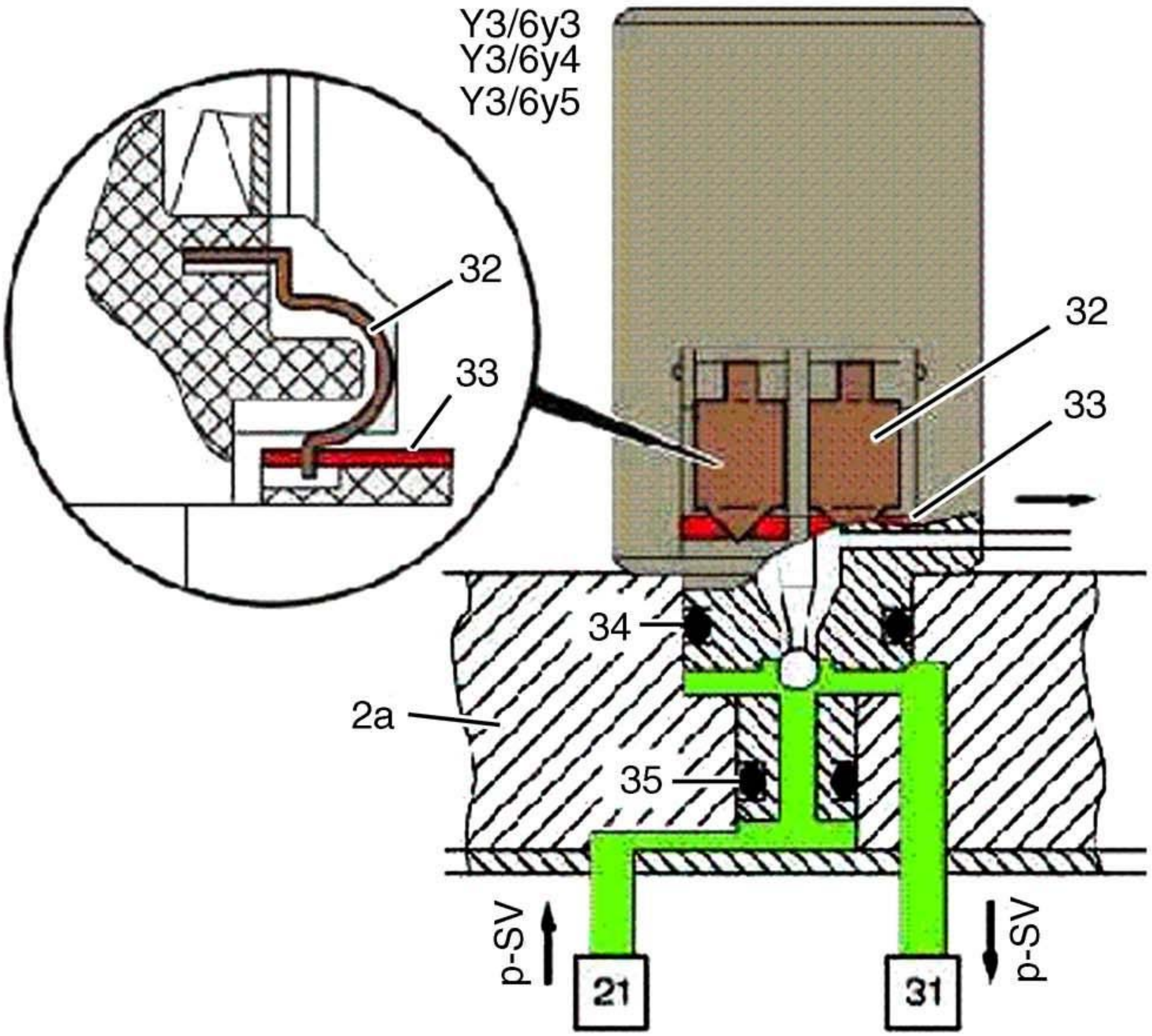


Fig. 48: Upshift/Downshift Solenoid Valve, Design

Structure - The shift solenoid valves (Y3/6y3, Y3/6y4, Y3/6y5) are sealed to the valve housing of the shift plate (2a) by two O-rings (34, 35) (2a). See **Fig. 48**.

The contact springs (32) on the shift solenoid valves (Y3/6y3, Y3/6y4, Y3/6y5) engages in a slot in the conductor tracks (33). The force of the contact spring (32) ensures safe contacts.

Upshift/Downshift Solenoid Valve, Function



0 Oil sump drain
2a Valve housing of shift plate
21 Shift valve pressure regulating valve
31 Command valve,
32 Contact spring

34 O-ring
35 O-ring
p-SV Shift valve pressure
Y3/6y3 1-2 and 4-5 shift solenoid valve
Y3/6y4 3-4 shift solenoid valve

Fig. 49: Upshift/Downshift Solenoid Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - If a shift solenoid valve (Y3/6y3, Y3/6y4, Y3/6y5) is actuated via the ETC control module (N15/3), it opens and directs the control pressure (p-SV) to the command valve assigned (31). See **Fig. 49**.

The respective shift solenoid valve (Y3/6y3, Y3/6y4, Y3/6y5) remains actuated and therefore open until the shift process is completed. The shift pressure (p-SV) to the command valve is reduced to zero as soon as the respective shift solenoid valve (Y3/6y3, Y3/6y4, Y3/6y5) is switched de-energized.

Automatic Transmission, Location Of Components, Floor Shift (With Touch Shift)

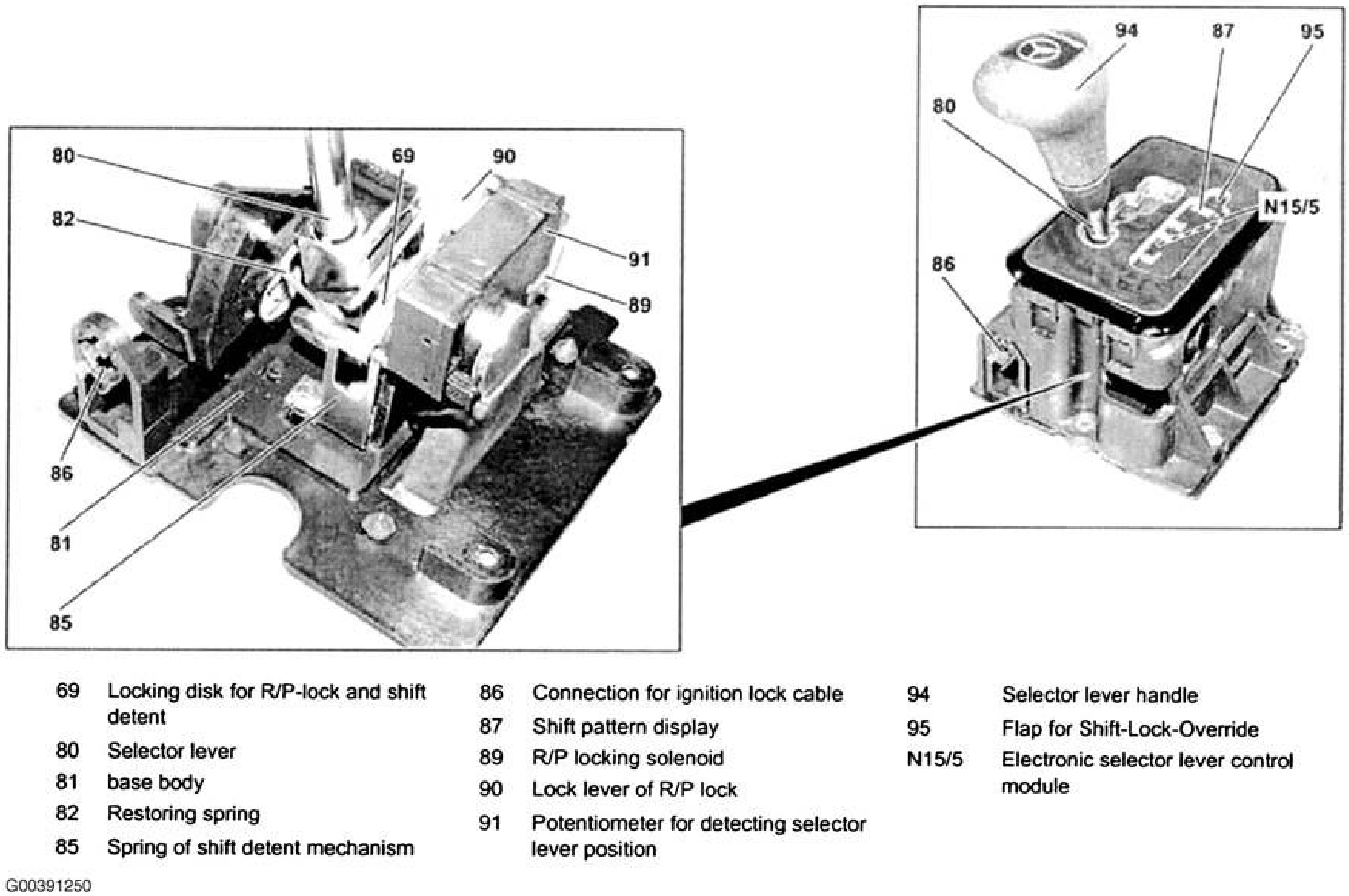


Fig. 50: Automatic Transmission, Location Of Components, Floor Shift
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Location/Task/Design/Function Of Oil Pump

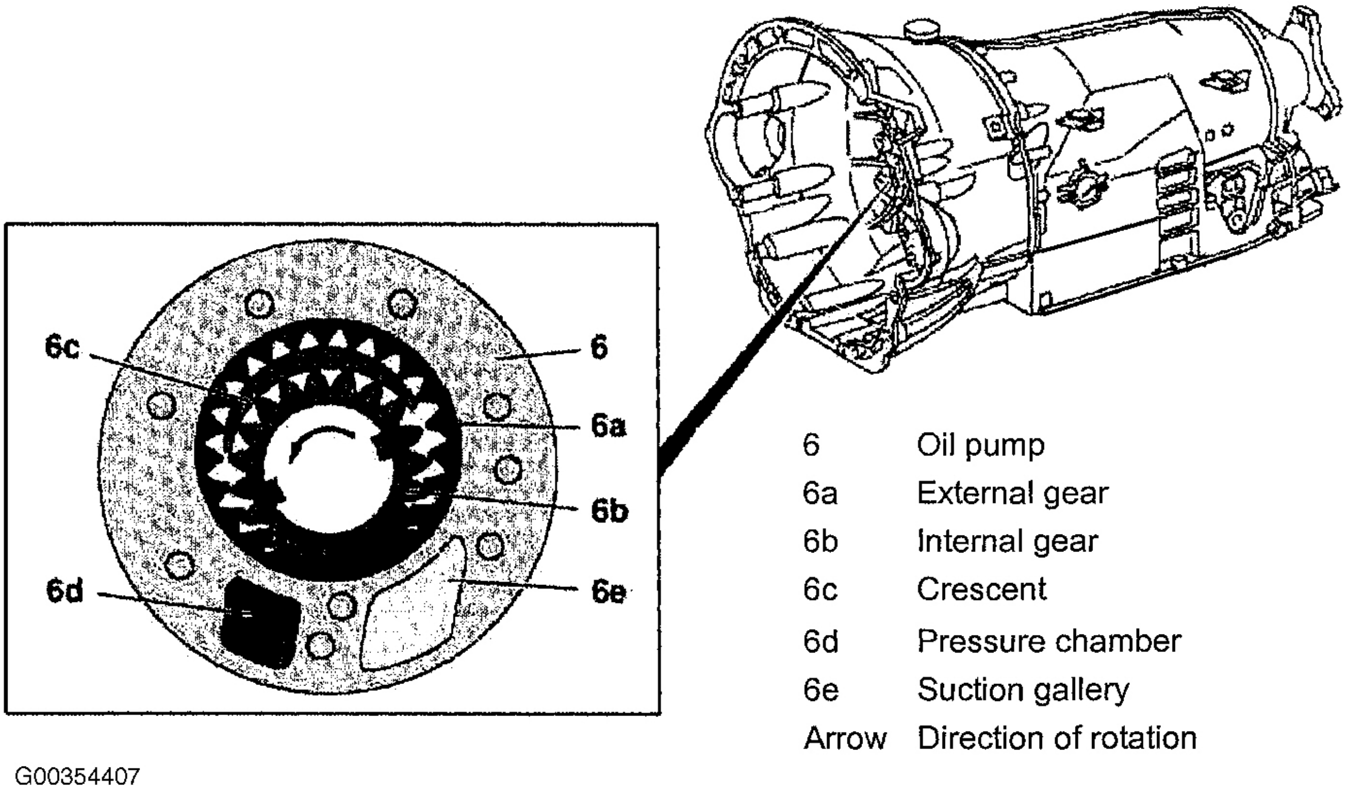


Fig. 51: Location/Task/Design/Function Of Oil Pump
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Oil Pump, Location

The oil pump (crescent-type pump) (6) is installed in the torque converter housing behind the torque converter and is driven by the drive flange of the torque converter. See **Fig. 51**.

Oil Pump, Task

To produce the necessary oil pressure for the hydraulic sequences.

Oil Pump, Design

An external gear (6a) which is mounted eccentrically in the pump housing is located on the internal gear (6b) which is connected to the drive flange (6b). The crescent (6c) drives the external gear (6a).

Oil Pump, Function

When the engine is running oil is delivered through the suction gallery (6e) along the top and bottom side of the crescent (6c) to the pressure chamber (6d) of the housing. The meshing of the teeth prevents oil

from flowing from the pressure side to the suction side.

Park Pawl, Location/Task/Design/Function

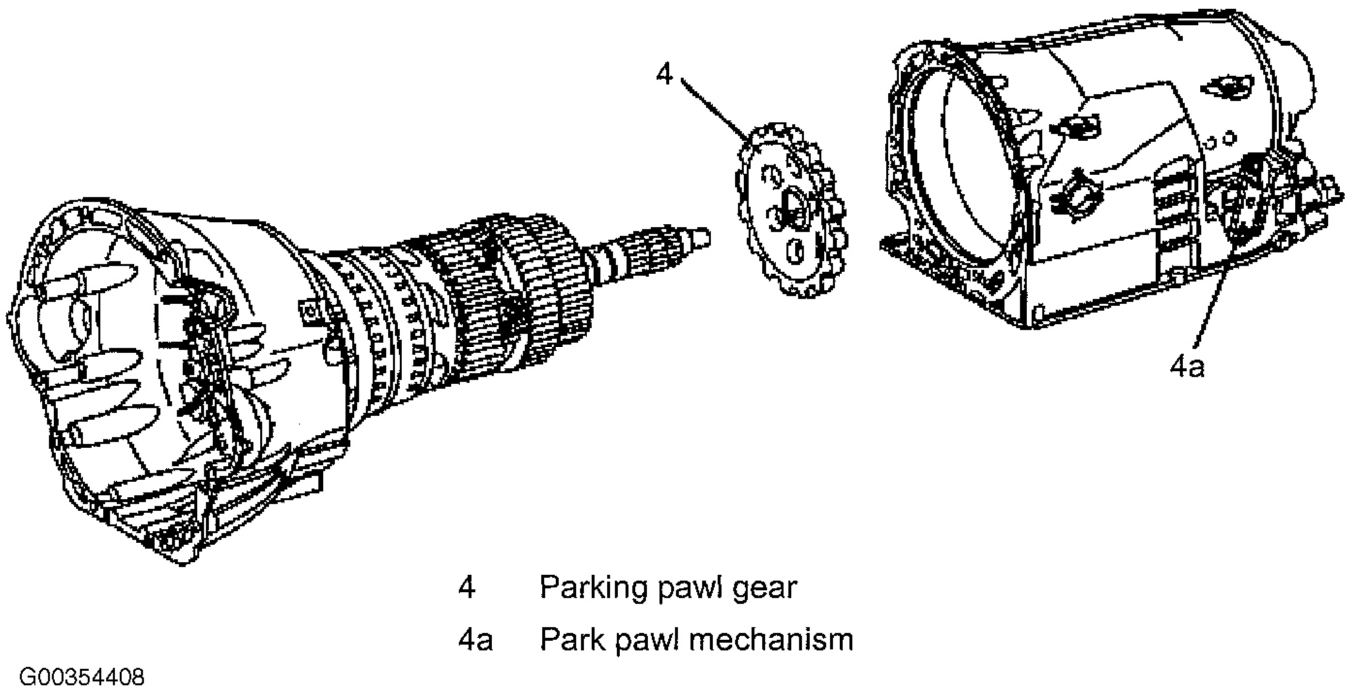


Fig. 52: Park Pawl, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Park Pawl, Location

The park pawl gear (4) and park pawl mechanism (4a) are located in the rear part of the transmission housing. See **Fig. 52**.

Park Pawl, Task

Secures the vehicle mechanically to prevent it from rolling in addition to the parking brake.

Park Pawl, Design

See **PARK PAWL, DESIGN**.

Park Pawl, Function

See **PARK PAWL, FUNCTION**.

Park Pawl, Design

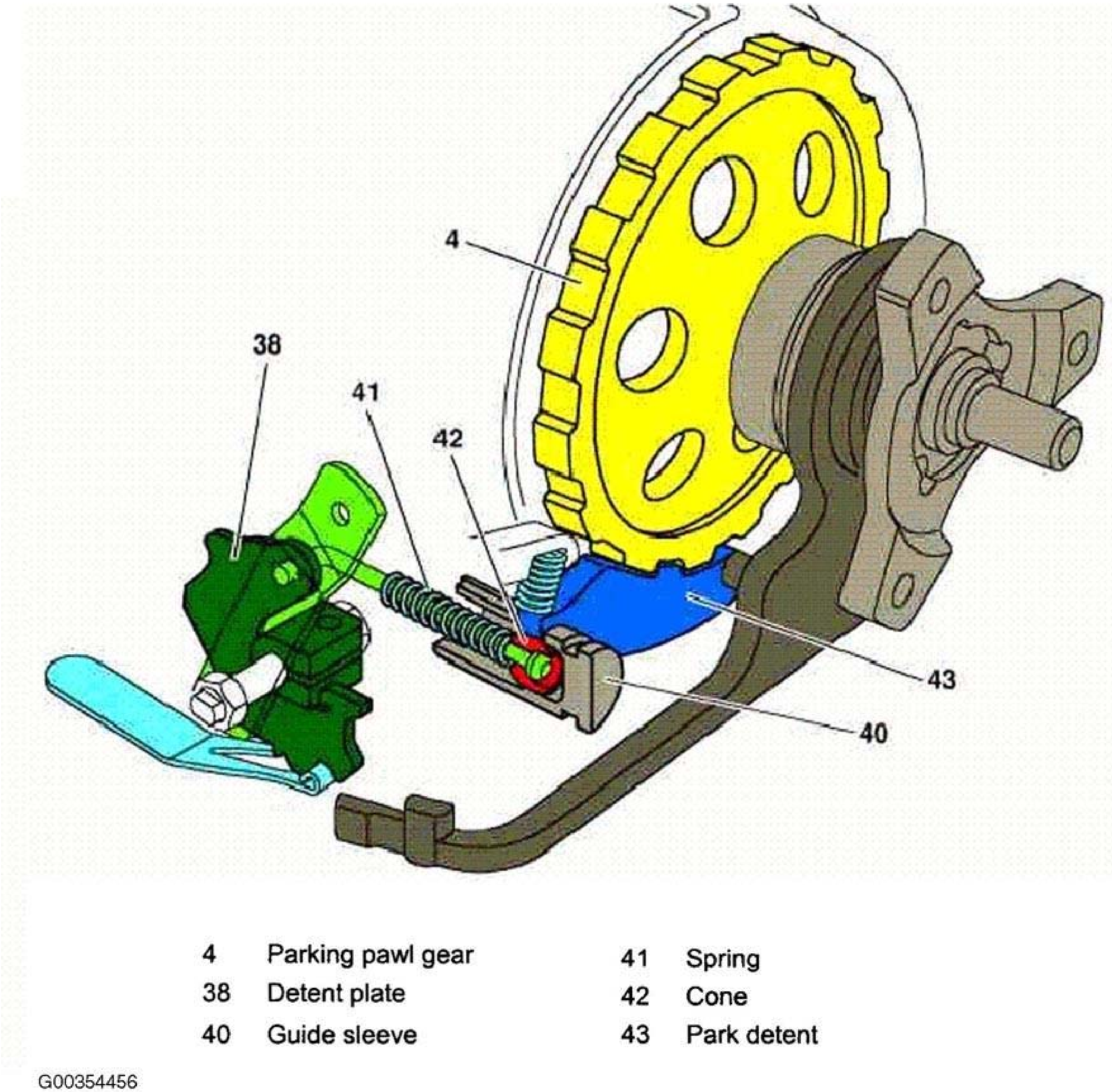


Fig. 53: Park Pawl, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Park Pawl, Function

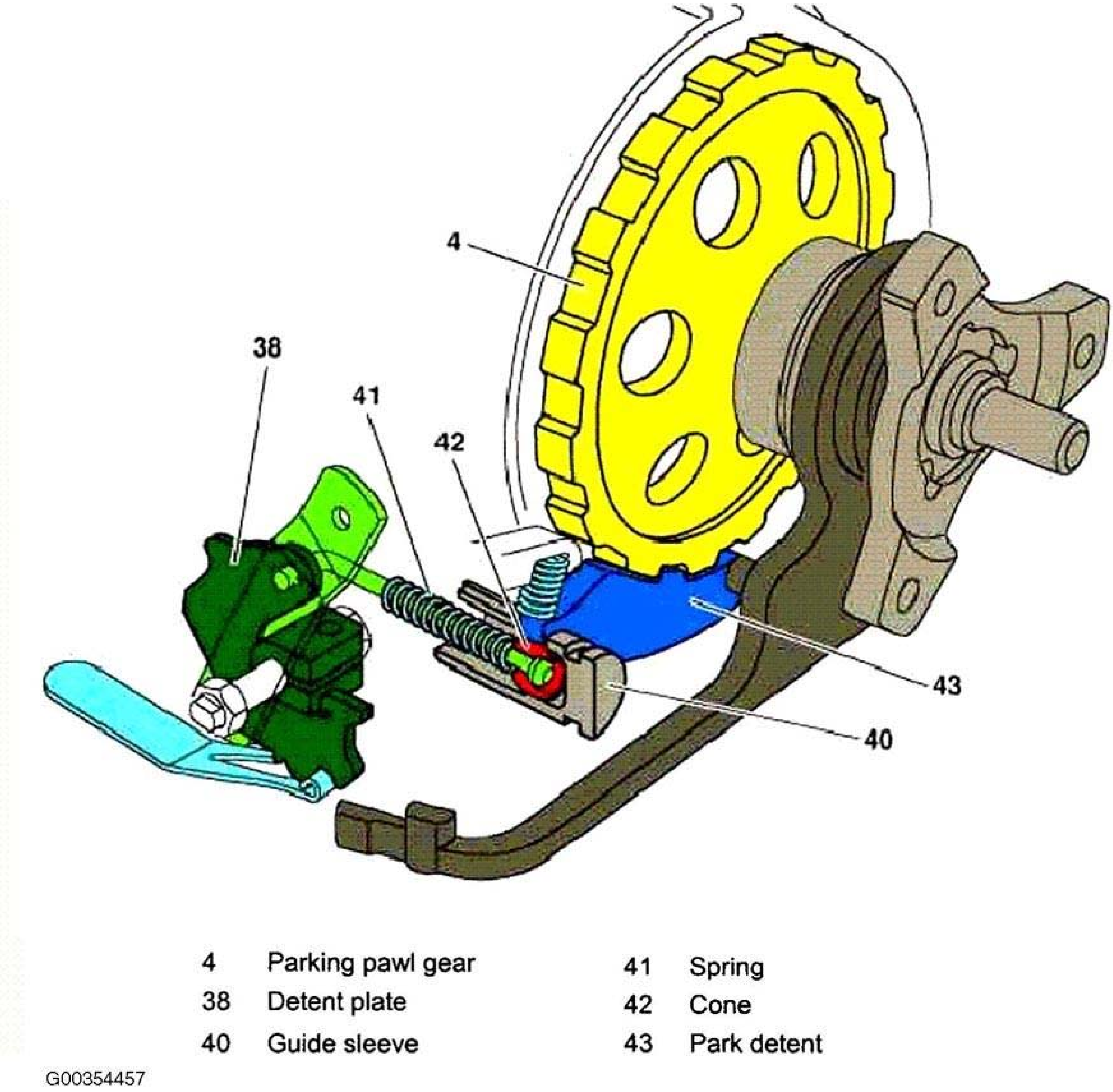


Fig. 54: Park Pawl, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

In selector lever position "P" the cone (42) moves between the park detent (43) and pilot bushing (40). The parking lock pawl (43) is therefore pushed against the parking lock gear (4). See **Fig. 54**. If the tooth of the parking lock pawl (43) does not engage in a tooth space when the vehicle is stationary, but rather touches a

tooth of the parking lock gear (4), the cone (42) is pre-tensioned by the spring (41) and positioned ready for operation. If the parking lock gear (4) continues to turn, the parking lock pawl (43) engages in the next tooth space.

To prevent damage due to misuse, the intervals between the tooth gaps are such that the park detent (43) can only engage when the vehicle is stationary or crawling at low speed. If the vehicle rolls faster, the shape of the teeth prevents the parking lock pawl (43) from engaging.

Planetary Gear Set, Location/Task/Design/Function

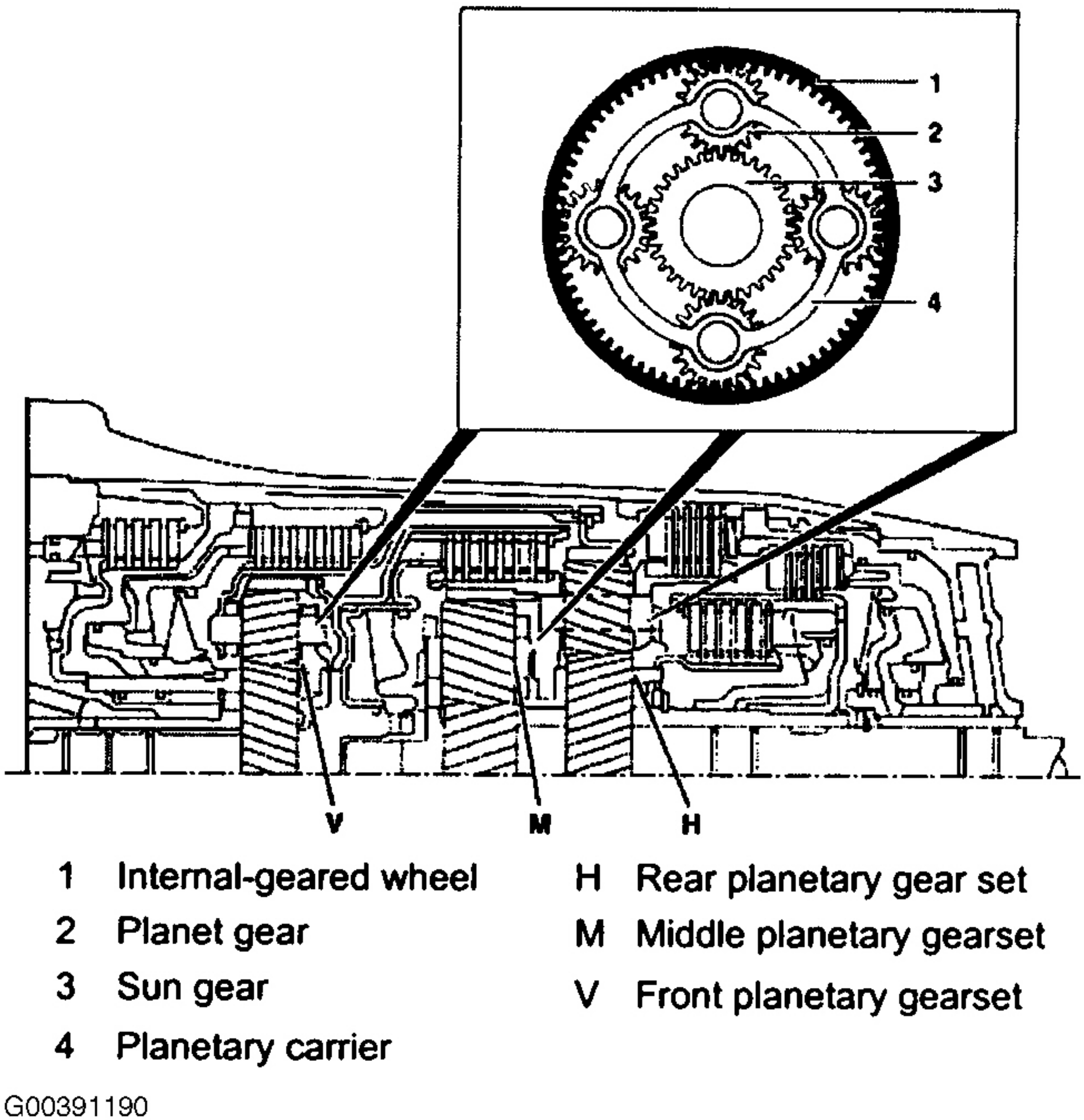


Fig. 55: Planetary Gear Set
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Planetary Gear Set, Location

Three planetary gear sets are used to produce the different gear ratios. These are located in the mechanical part of the transmission as the front, center and rear planetary gear set (V, M, H). See **Fig. 55**.

Planetary Gear Set, Task

Power transmission and production of different gear ratios.

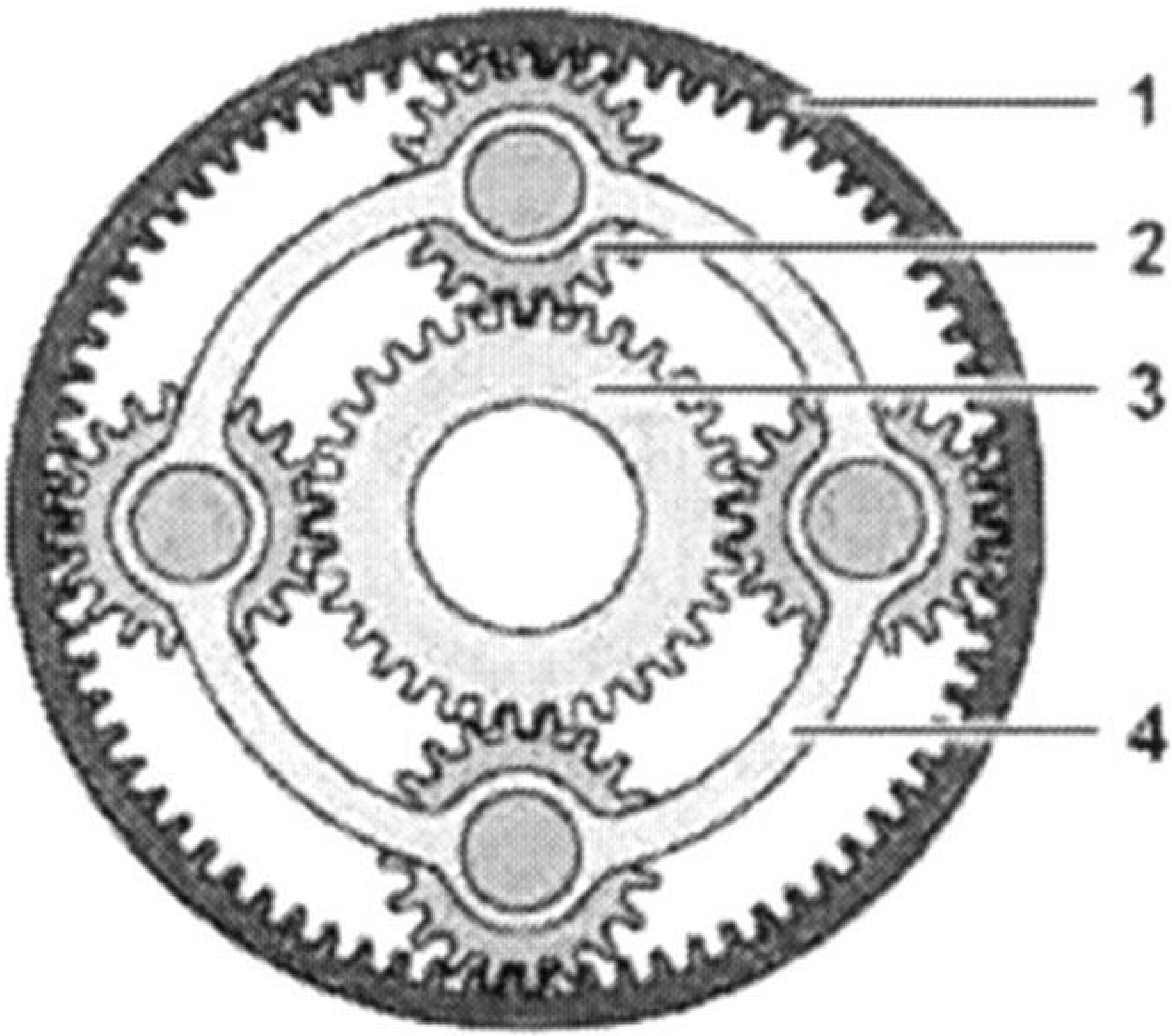
Planetary Gear Set, Design

A planetary gear set consists of the ring gear (1), the planet gears (2) carried in the planet carrier (4) and the sun gear (3).

Planetary Gear Set, Function

See **PLANETARY GEAR SET, FUNCTION**.

Planetary Gear Set, Function



1	Internal-geared wheel
2	Planet gear
3	Sun gear
4	Planetary carrier

Fig. 56: Planetary Gear Set, Function (1 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - The ring gear (1) and sun gear (3) elements of a planetary gear system are alternately driven and braked by the actuating elements of the multi-plate clutch and multiple-disc brake. See .**Fig. 56** The planet gears (2) can turn on the internal gearing of the ring gear (1) and on the external gearing of the sun gear (3). This allows for a variety of gear ratios and the reversal of the rotation direction without the need for moving gear wheels or shift collars.

The torque and speed are converted corresponding to the lever ratios or the ratio of the number of teeth on the driven to the driving gears and is known as the gear ratio i. The overall ratio of a number of planetary gear sets connected in series is obtained by multiplying the partial ratios. When two components of the planetary gear set are locked together, the planetary gear set is locked and turns as a closed unit.

Advantages Of A Planetary Gear Set:

- Shifting Ability Under Load
- Several Ratios Can Be Produced
- Constant Meshing Of The Gears
- Simple Direction Reversal
- High Efficiency
- Coaxial Location Of Input And Output
- Compact Design

The Following Basic Ratio Possibilities Can Be Realized

See **Fig. 57**.

- Sun Gear Locked
- Ring Gear Driving
- Planet Gears Driven
- Relatively Low Step-Down Ratio

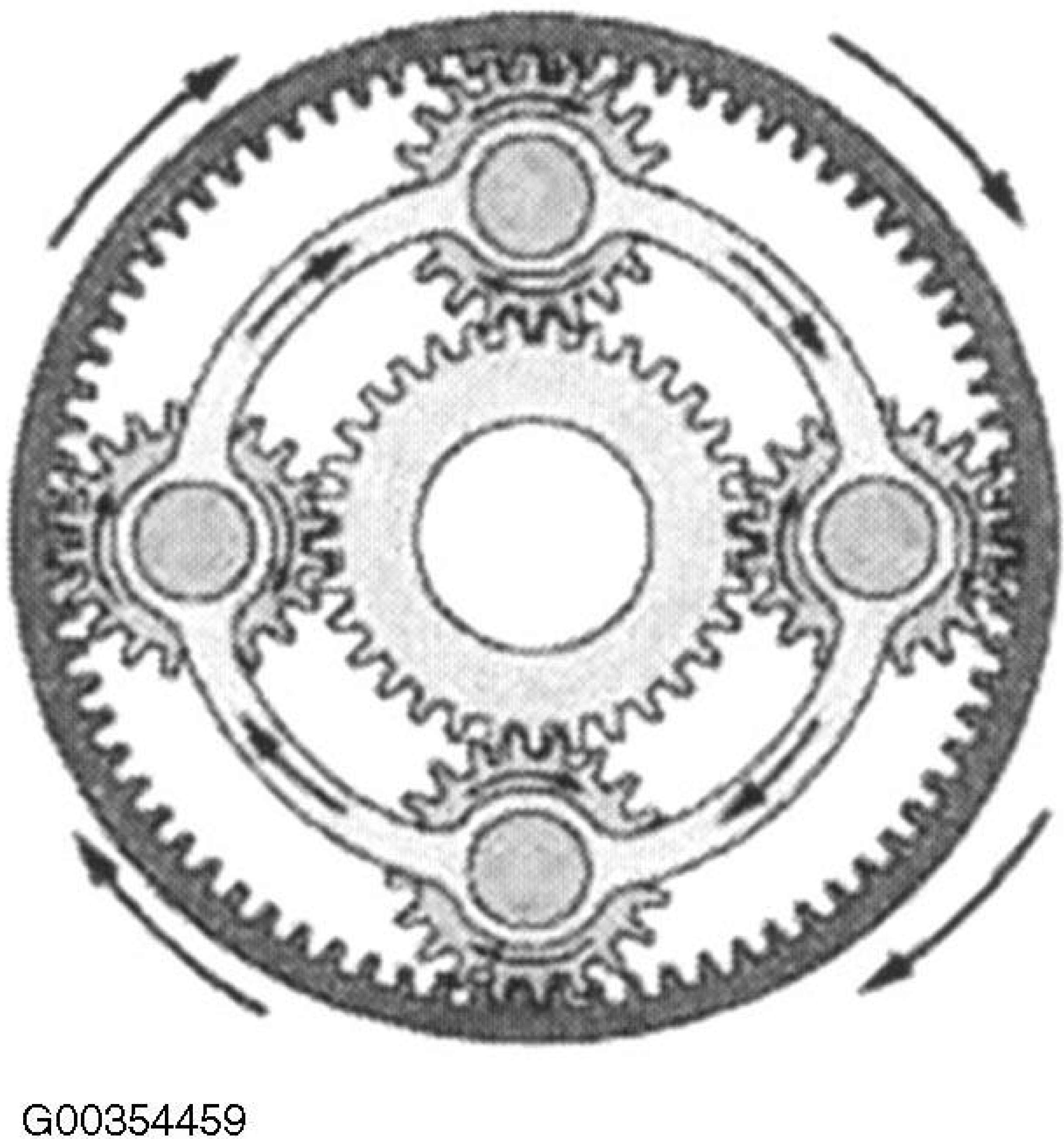


Fig. 57: Planetary Gear Set, Function (2 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

See **Fig. 58**.

- Hollow Gear Locked
- Sun Gear Driving
- Planet Gears Driven
- Relatively High Step-Down Ratio



Fig. 58: Planetary Gear Set, Function (3 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Locking two elements together so that the planetary gear set turns as a unit, produces a direct power

transmission (i =1). See **Fig. 59**.

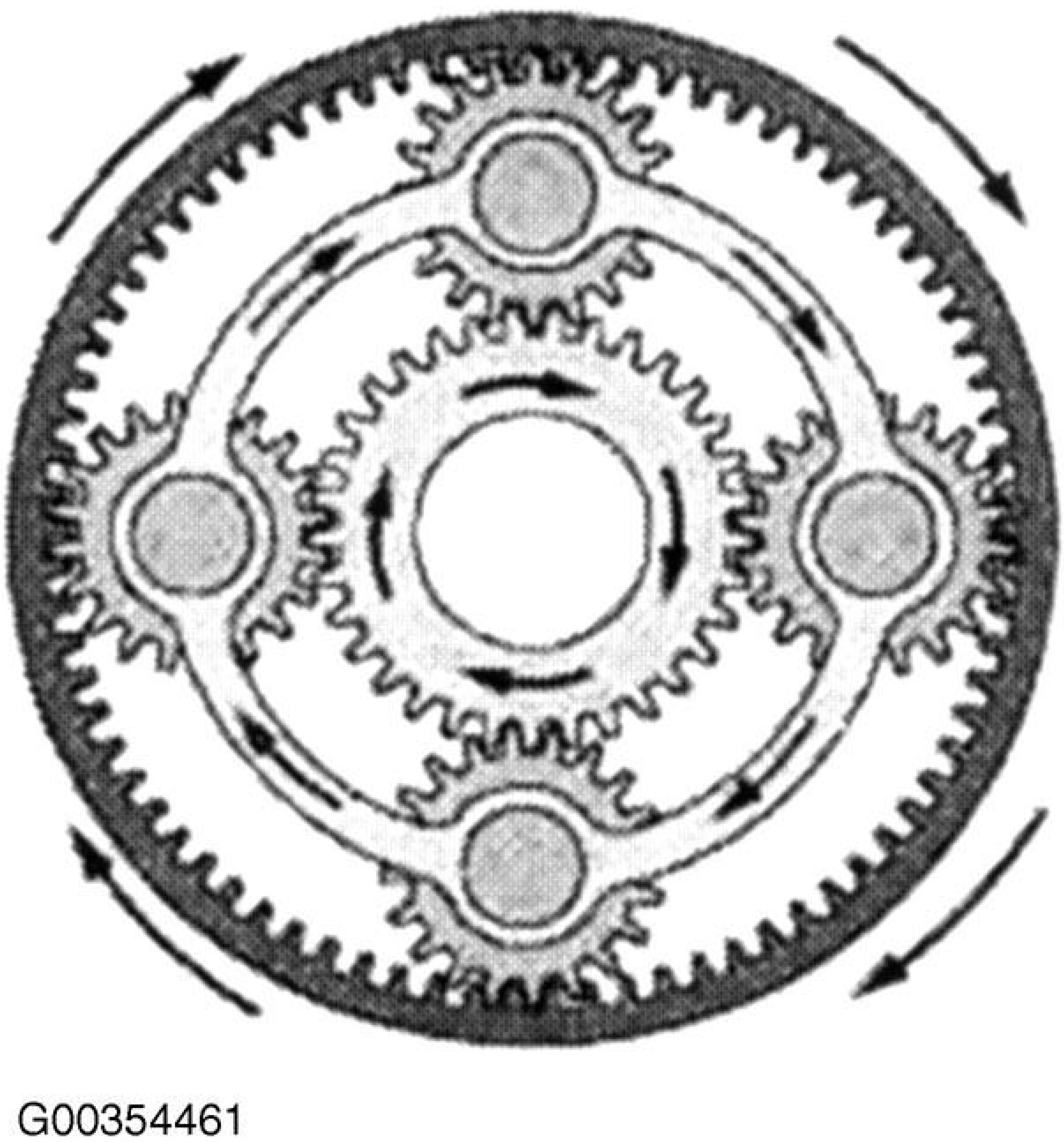


Fig. 59: Planetary Gear Set, Function (4 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

See **Fig. 60**.

- Planetary Carrier Locked
- Sun Gear Driving
- Ring Gear Driven
- Direction Reversal And Step-Down Ratio

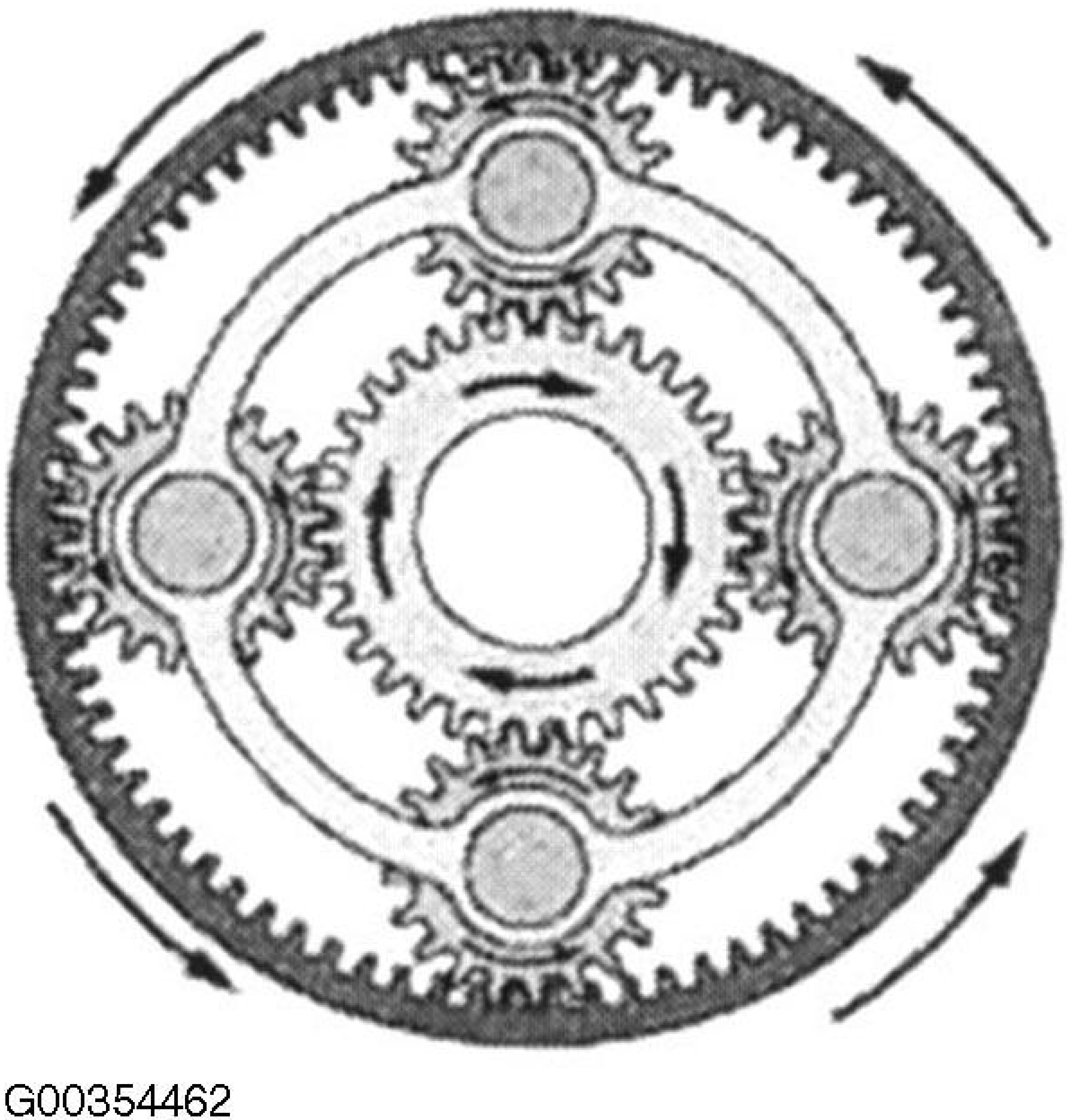


Fig. 60: Planetary Gear Set, Function (5 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Position Display, Location Task

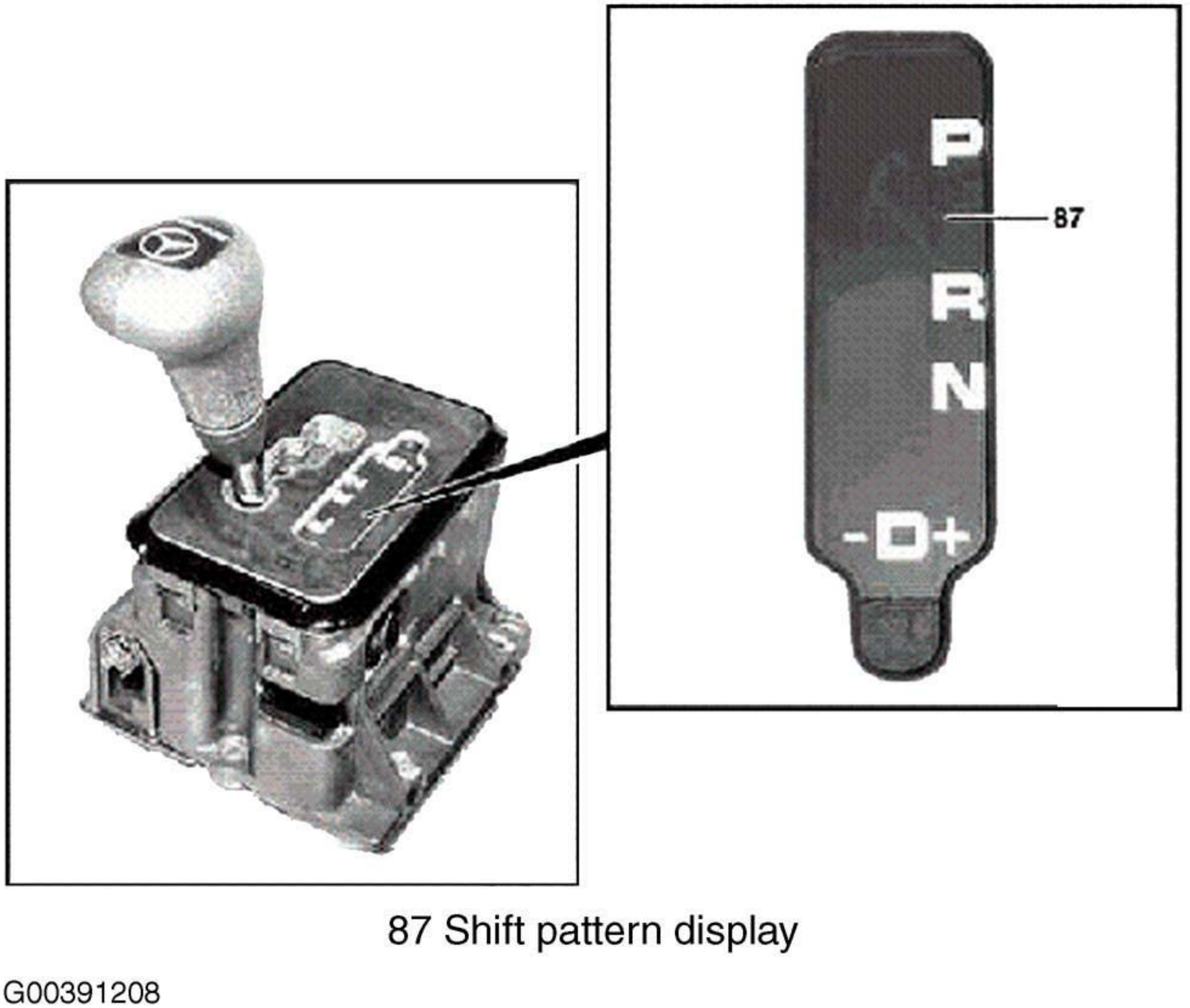


Fig. 61: Position Display
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

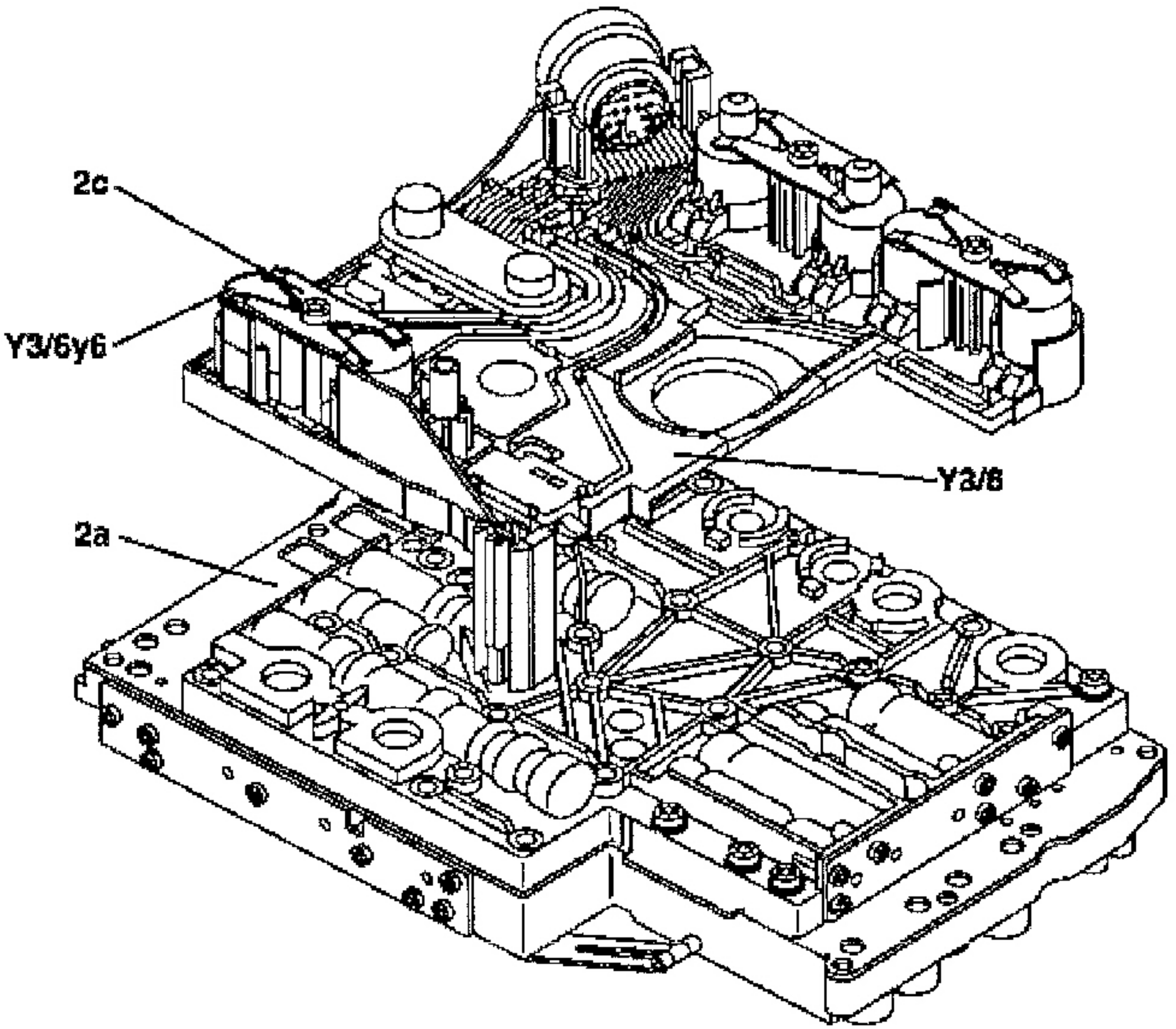
Position Display, Location

The position display (selector scheme symbols (87)) is accommodated in the floor shift cover. In addition a gear display is located in the instrument cluster (A1). See **Fig. 61**.

Position Display, Task

Via the selector scheme symbols (87) the alternative selector lever positions and their sequence are shown symbolically.

Location/Task/Design/Function Of PWM Solenoid Valve, Torque Converter Lockup Clutch



2a	Valve housing of shift plate	Y3/6	Electric control unit
2c	Left spring	Y3/6y6	Torque converter lockup PWM solenoid valve

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Fig. 62: Torque Converter Lockup PWM Solenoid Valve
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Torque Converter Lockup PWM Solenoid Valve, Location

In the supporting body of the electrical control unit (Y3/6) and pressed against the valve housing of the shift plate (2a) by means of a leaf spring (2c). See **Fig. 62**.

Torque Converter Lockup PWM Solenoid Valve, Task

The PWM solenoid valve for the torque converter lockup (Y3/6y6) controls the pressure for the torque converter lockup clutch.

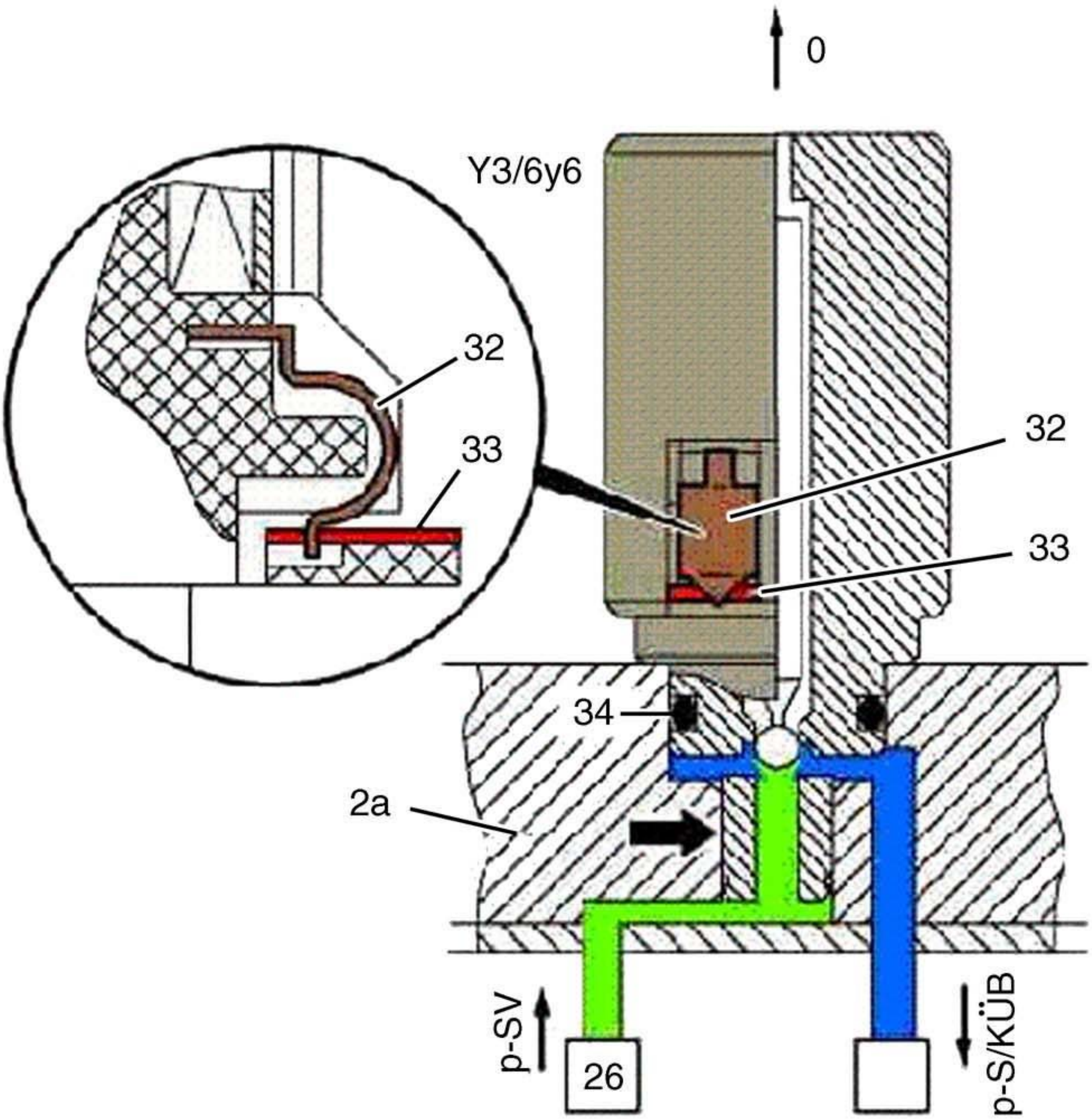
Torque Converter Lockup PWM Solenoid Valve, Design

See **TORQUE CONVERTER LOCKUP PWM SOLENOID VALVE, DESIGN**.

Torque Converter Lockup PWM Solenoid Valve, Function

it converts a pulse-width-modulated current actuated by the ETC control module (N15/3) into the corresponding hydraulic pressure KUB (p-S/KUB).

Torque Converter Lockup PWM Solenoid Valve, Design

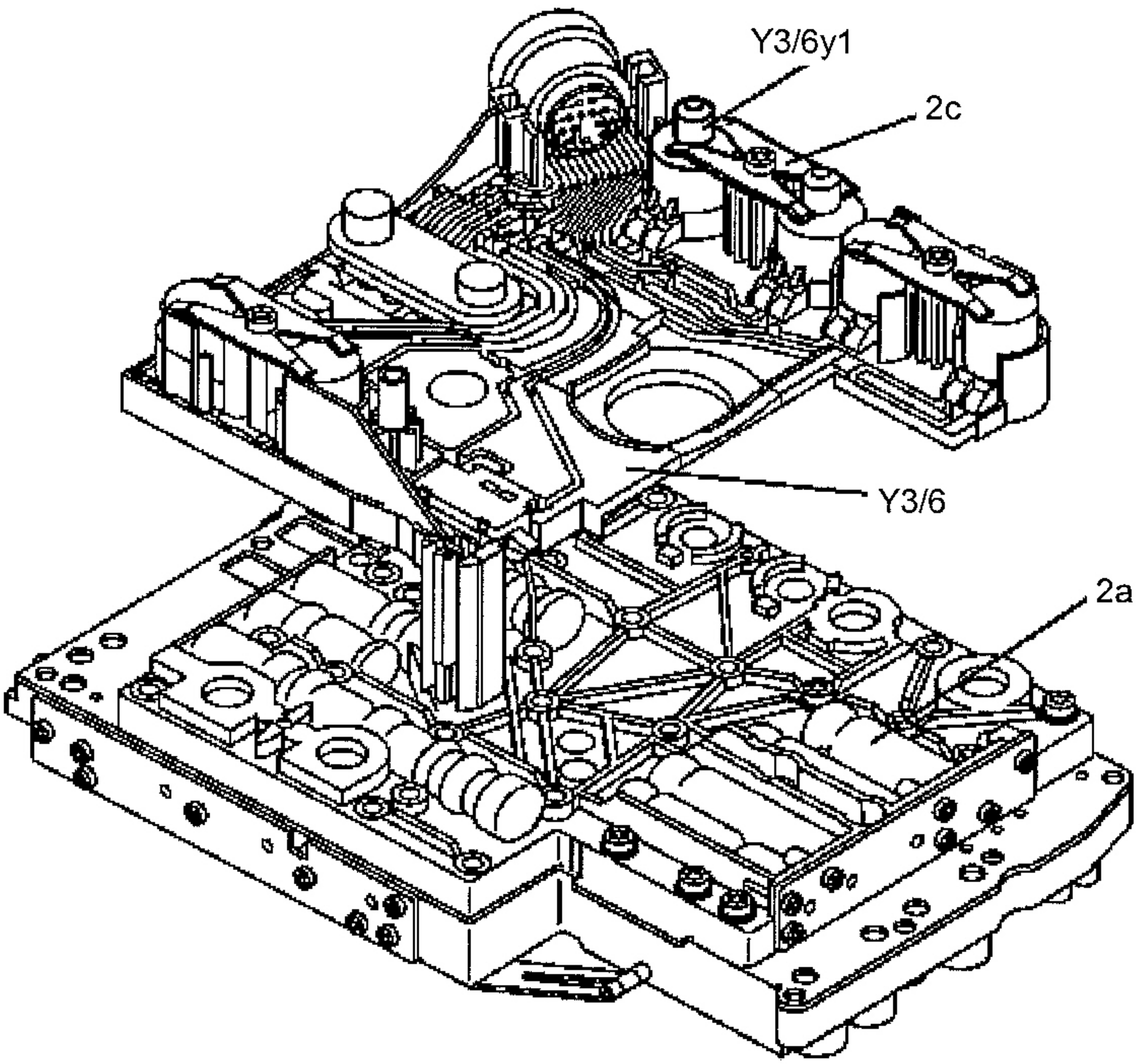


0	Oil sump drain	34	O-ring
2a	Valve housing of shift plate	p-S/KUB	KUB control pressure
		p-SV	Shift valve pressure
26	Shift valve pressure	Y3/6y6	Torque converter

Fig. 63: Torque Converter Lockup Clutch PWM Solenoid Valve, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Structure - The torque converter lockup PWM solenoid valve (Y3/6y6) is sealed off to the valve body of the shift plate (2a) by an O-ring (34) and a seal (arrow). See **Fig. 63**. The contact springs (32) on the PWM converter lockup solenoid valve (Y3/6y6) engage in a slot in the conductor tracks (33). The force of the contact spring (32) ensures safe contacts.

Modulating Pressure Regulating Solenoid Valve, Location/Task/Design/Function



2a	Valve housing of shift plate
2c	Left spring
Y3/6	Electric control unit
Y3/6y1	Modulating pressure control solenoid valve

G00354411

Fig. 64: Modulating Pressure Regulating Solenoid Valve, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Modulating Pressure Regulating Solenoid Valve, Location

In the supporting body of the electrical control unit (Y3/6) and pressed against the valve housing of the shift plate (2a) by means of a leaf spring. See **Fig. 64**.

Modulating Pressure Regulating Solenoid Valve, Task

To control the modulating pressure depending on the constantly changing operating conditions such as load/gear changes.

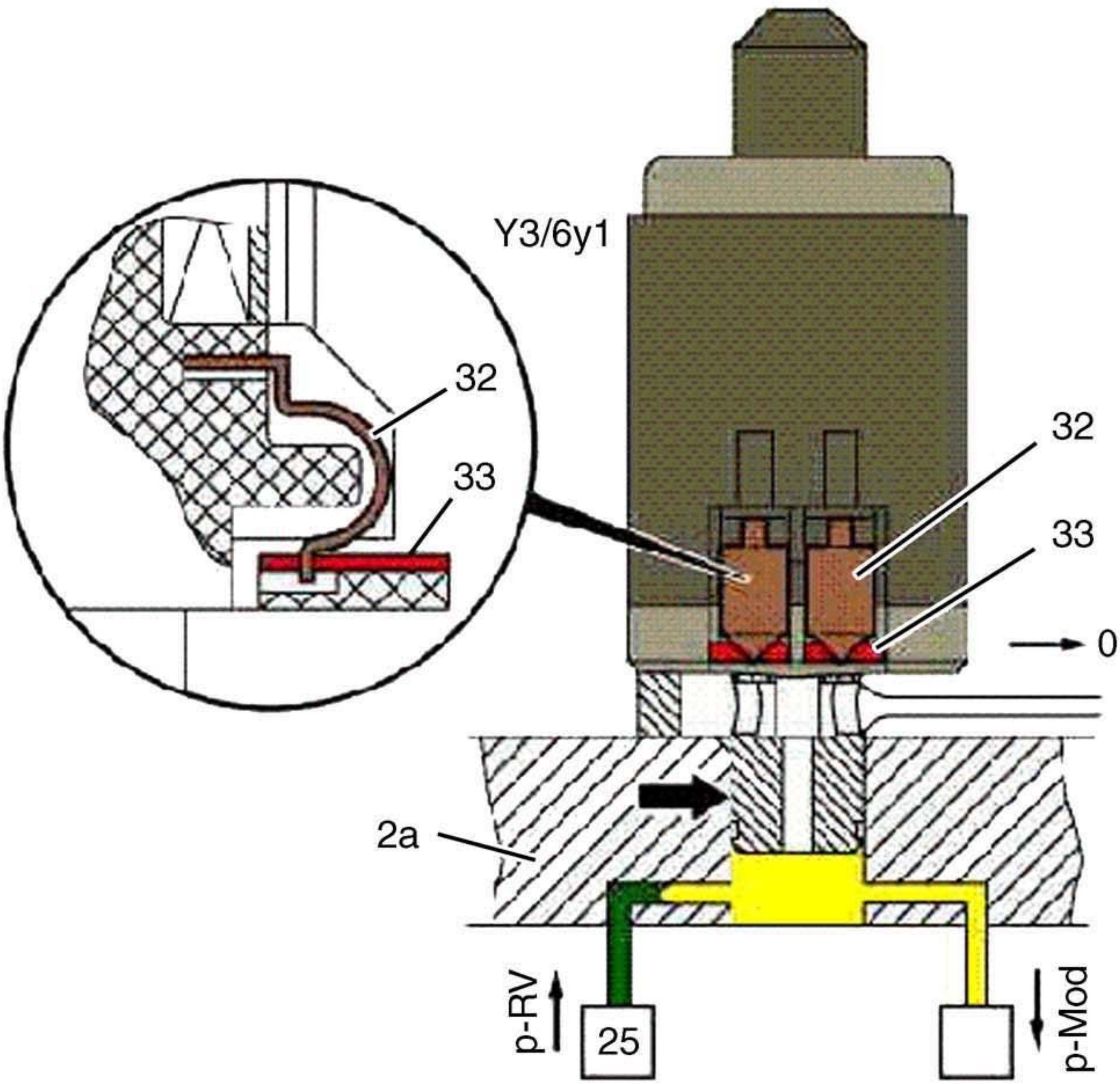
Modulating Pressure Regulating Solenoid Valve, Design

See **MODULATING PRESSURE REGULATING SOLENOID VALVE, DESIGN**.

Modulating Pressure Regulating Solenoid Valve, Function

The modulating pressure regulating solenoid valve (Y3/6y1) assigns a proportional pressure to the current which is controlled by the ETC control module (N15/3) according to the load.

Modulating Pressure Regulating Solenoid Valve, Design

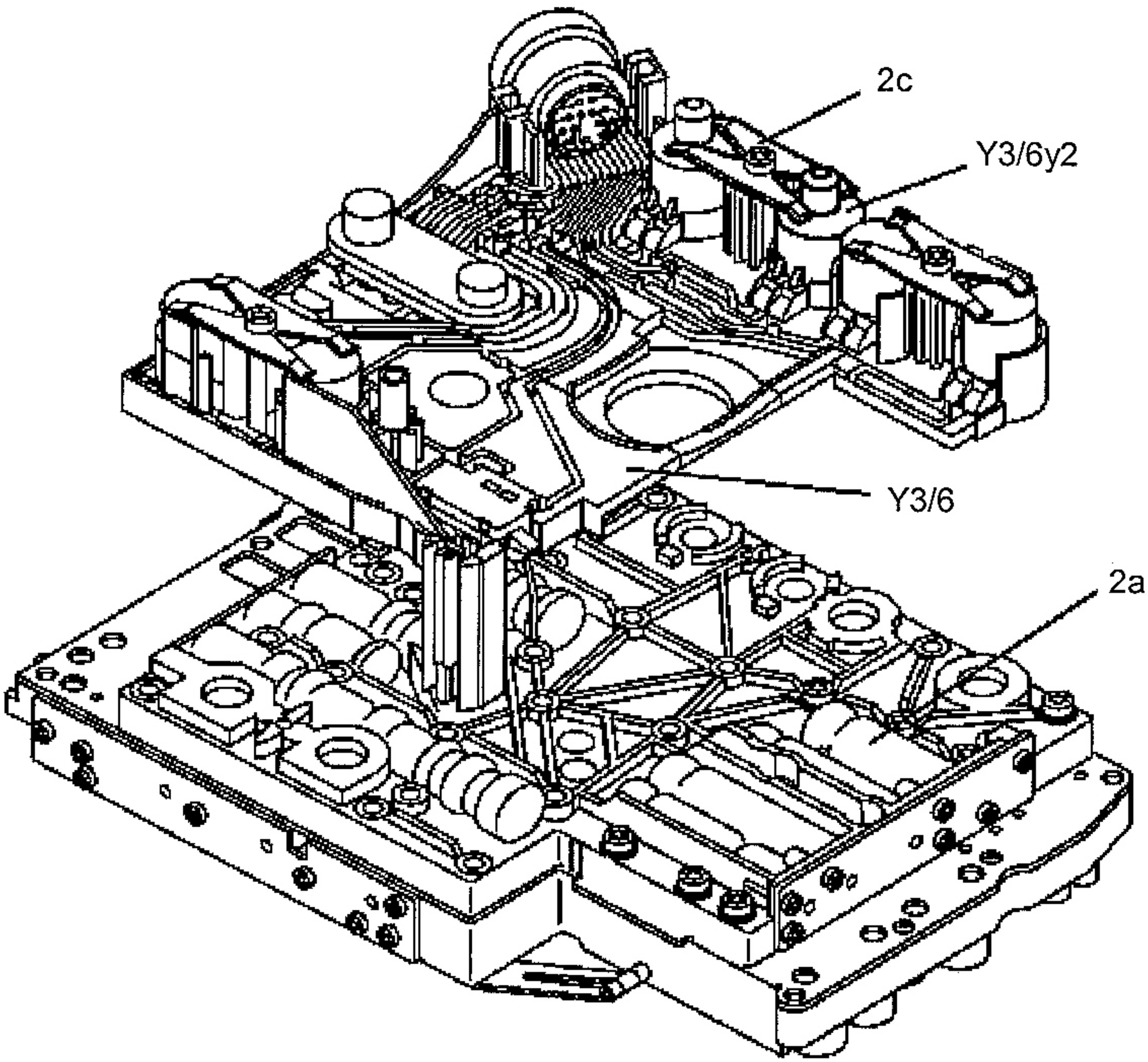


0	Oil sump drain	p-Mod	Modulating pressure
2a	Valve housing of shift plate	p-RV	Regulating valve pressure
25	Regulating valve pressure regulating valve	Y3/6y1	Modulating pressure control solenoid valve
32	Contact spring	Arrow	Seal
33	Conductor track		

Fig. 65: Modulating Pressure Regulating Solenoid Valve
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Structure - The modulating pressure regulating solenoid valve (Y3/6y1) had an interference fit and is sealed of to the valve body of the shift plate (2a) by a seal (arrow). See **Fig. 65**. The contact springs (32) on the modulating pressure regulating solenoid valve (Y3/6y1) engage in a slot in the conductor tracks (33). The force of the contact spring (32) ensures safe contacts.

Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function



2a	Valve housing of shift plate
2c	Left spring
Y3/6	Electric control unit
Y3/6y2	Shift pressure control solenoid valve

G00354412

Fig. 66: Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Pressure Regulating Solenoid Valve, Location

In the supporting body of the electrical control unit (Y3/6) and pressed against the valve housing of the shift plate (2a) by means of a leaf spring. See **Fig. 66**.

Shift Pressure Regulating Solenoid Valve, Task

To control the shift pressure depending on the constantly changing operating conditions, such as load/gear changes.

Shift Pressure Regulating Solenoid Valve, Design

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, DESIGN**.

Shift Pressure Regulating Solenoid Valve, Function

The shift pressure regulating solenoid valve (Y3/6y2) assigns a proportional pressure to the current which is controlled by the ETC control module (N15/3) according to the load.

Shift Pressure Regulating Valve, Location/Task/Function

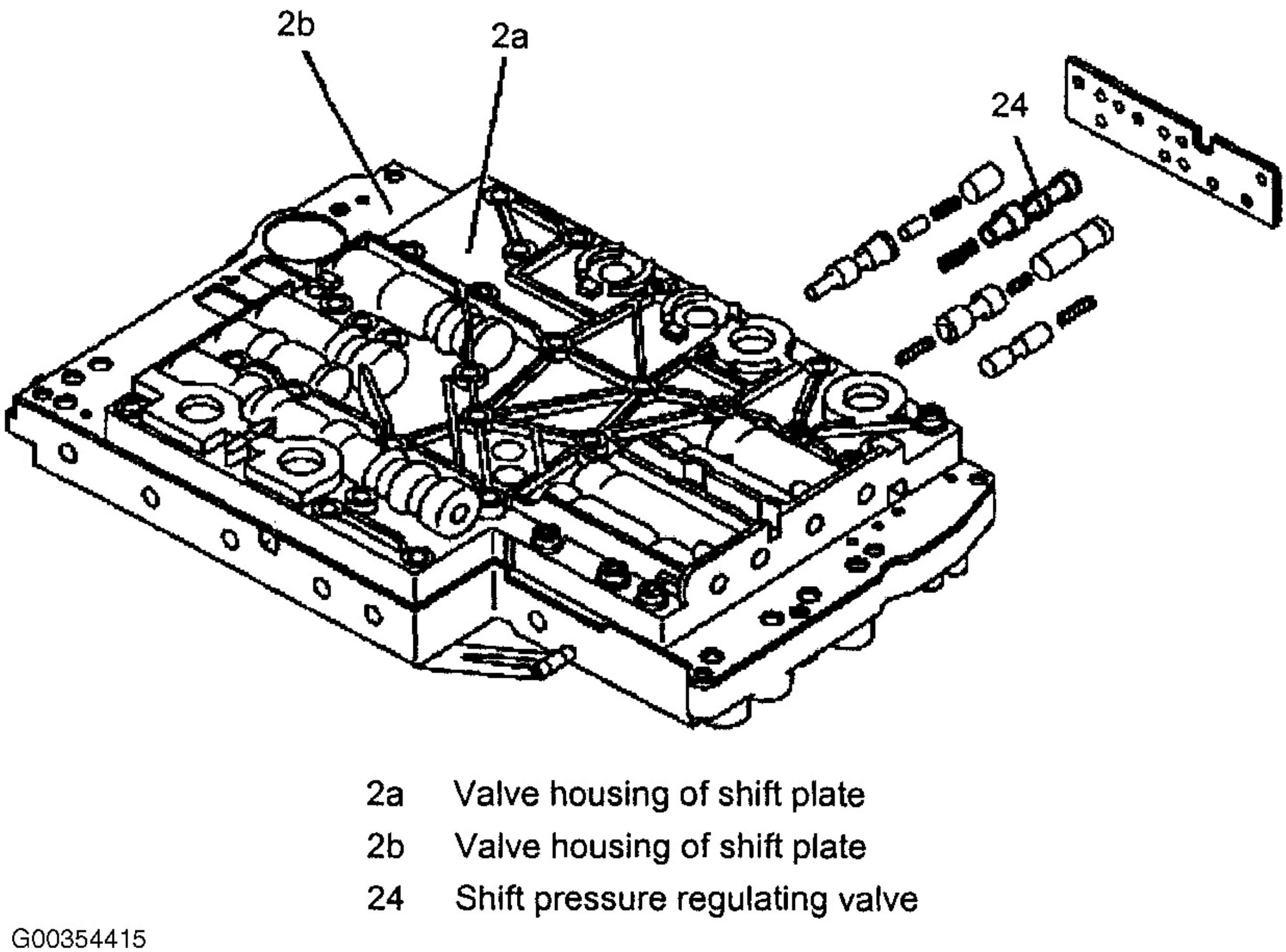


Fig. 67: Shift Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Pressure Regulating Valve, Location

In the valve housing of shift plate (2b). See **Fig. 67**.

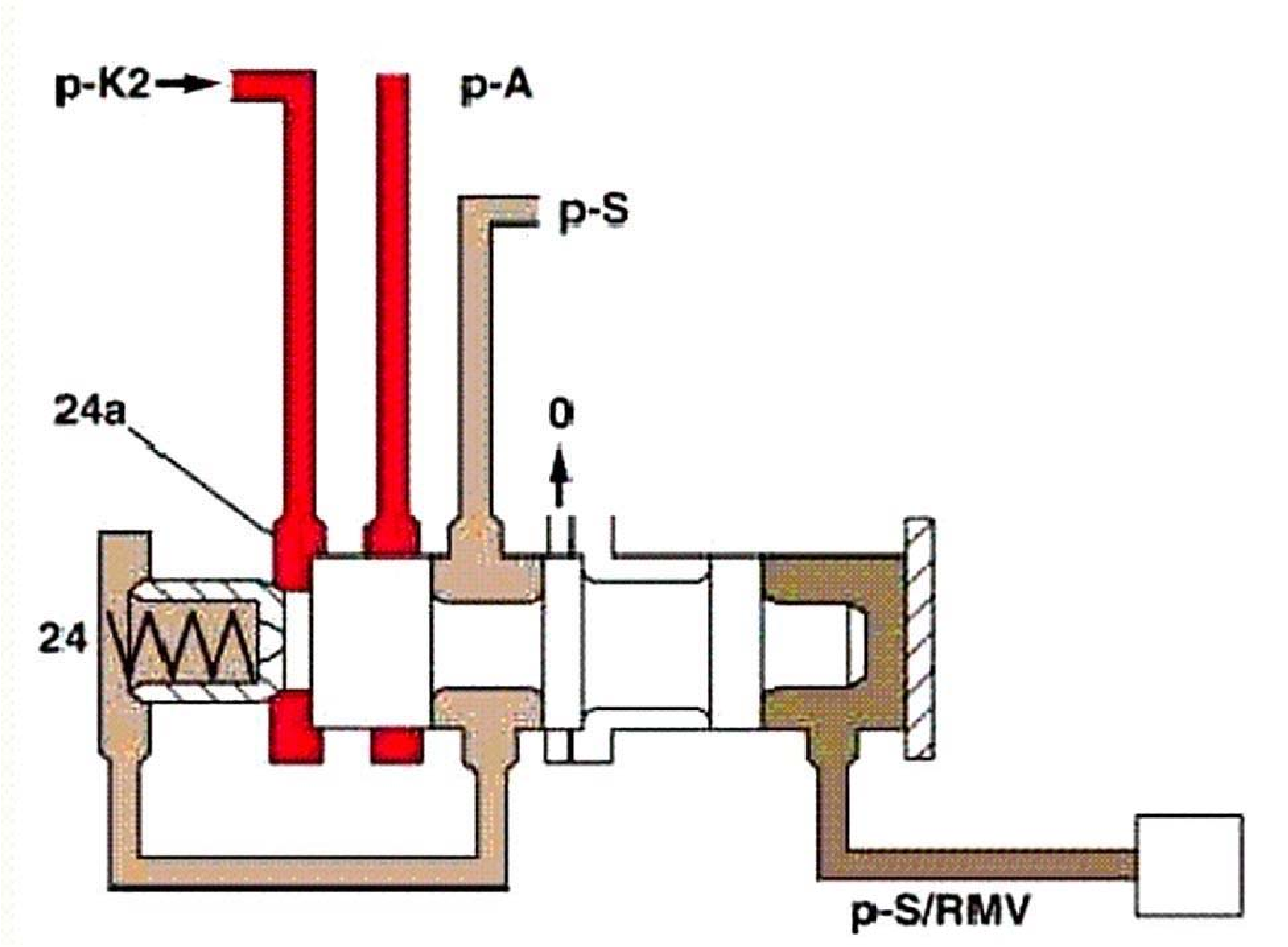
Shift Pressure Regulating Valve, Task

Control of shift pressure.

Shift Pressure Regulating Valve, Function

See **SHIFT PRESSURE REGULATING VALVE, FUNCTION**.

Shift Pressure Regulating Valve, Function



0	Oil sump drain
24	Shift pressure regulating valve
24a	Annular surface
p-A	Working pressure
p-K2	Pressure applied to the rear multiple-disc clutch
p-S	Shift pressure
p-S/RMV	Shift pressure control solenoid valve

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Fig. 68: Shift Pressure Regulating Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - The shift pressure (p-S) is determines by the shift pressure regulating solenoid valve (Y3/6y2) and the shift pressure regulating valve (24). See **Fig. 68**. In addition, pressure from the multiple-disc clutch K2 (p-K2) is also present at the annular surface (24a) of the shift pressure regulating valve (24). This reduces the shift pressure in 2nd gear.

Working Pressure Regulating Valve, Location/Task/Function

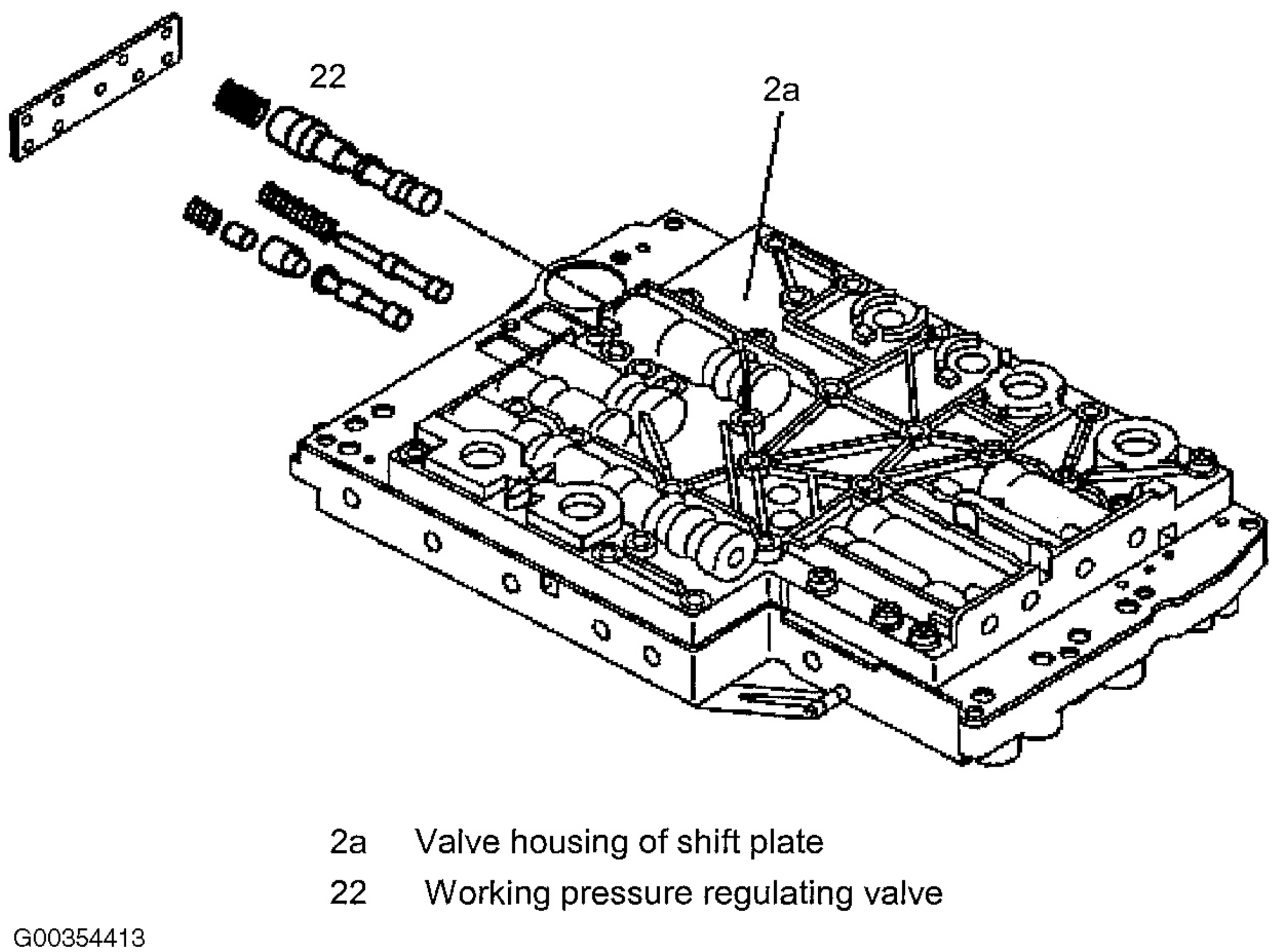


Fig. 69: Working Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Working Pressure Regulating Valve, Location

In the valve housing of the shift plate. See **Fig. 69**.

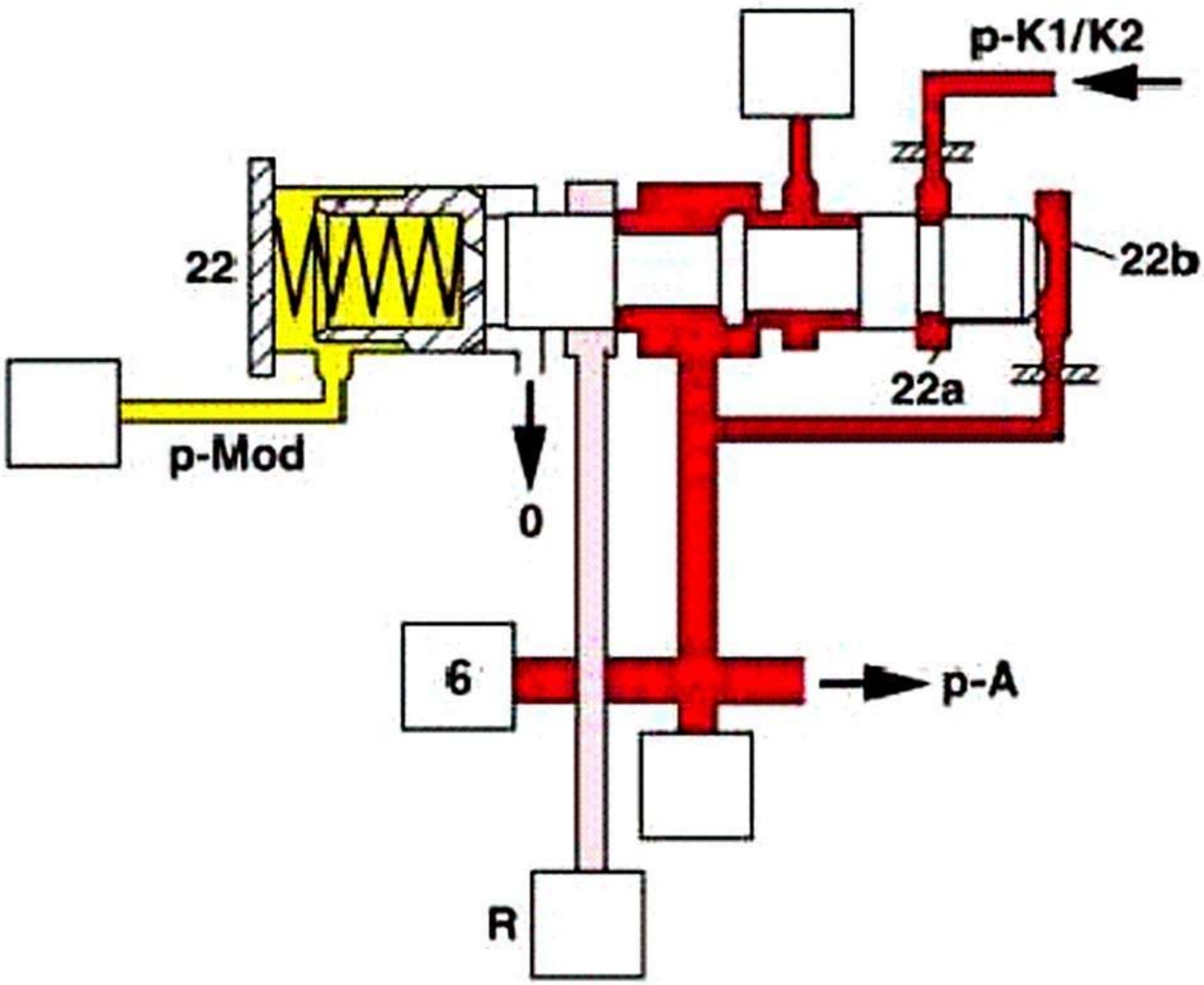
Working Pressure Regulating Valve, Task

Regulates the primary pressure of the hydraulic system.

Working Pressure Regulating Valve, Function

See **WORKING PRESSURE REGULATING VALVE, FUNCTION**.

Working Pressure Regulating Valve, Function



0	Oil sump drain
6	Oil pump
22	Working pressure regulating valve
22a	Annular surface
22b	Face end
p-A	Working pressure
p-K1/K2	Prevailing pressure at front or rear multiple-disc clutch
p-Mod	Modulating pressure

Fig. 70: Shift Pressure Regulating Solenoid Valve, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - The working pressure (p-A) is regulated at the working pressure regulating valve (22) depending on the load (modulating pressure (p-Mod)) and depending on the gear (p-K1, p-K2). See **Fig. 70**. A minimum level (basic pressure) is adjusted by the spring in the working pressure regulating valve (22).

Regulating Valve Pressure Regulating Valve, Location/Task/Function

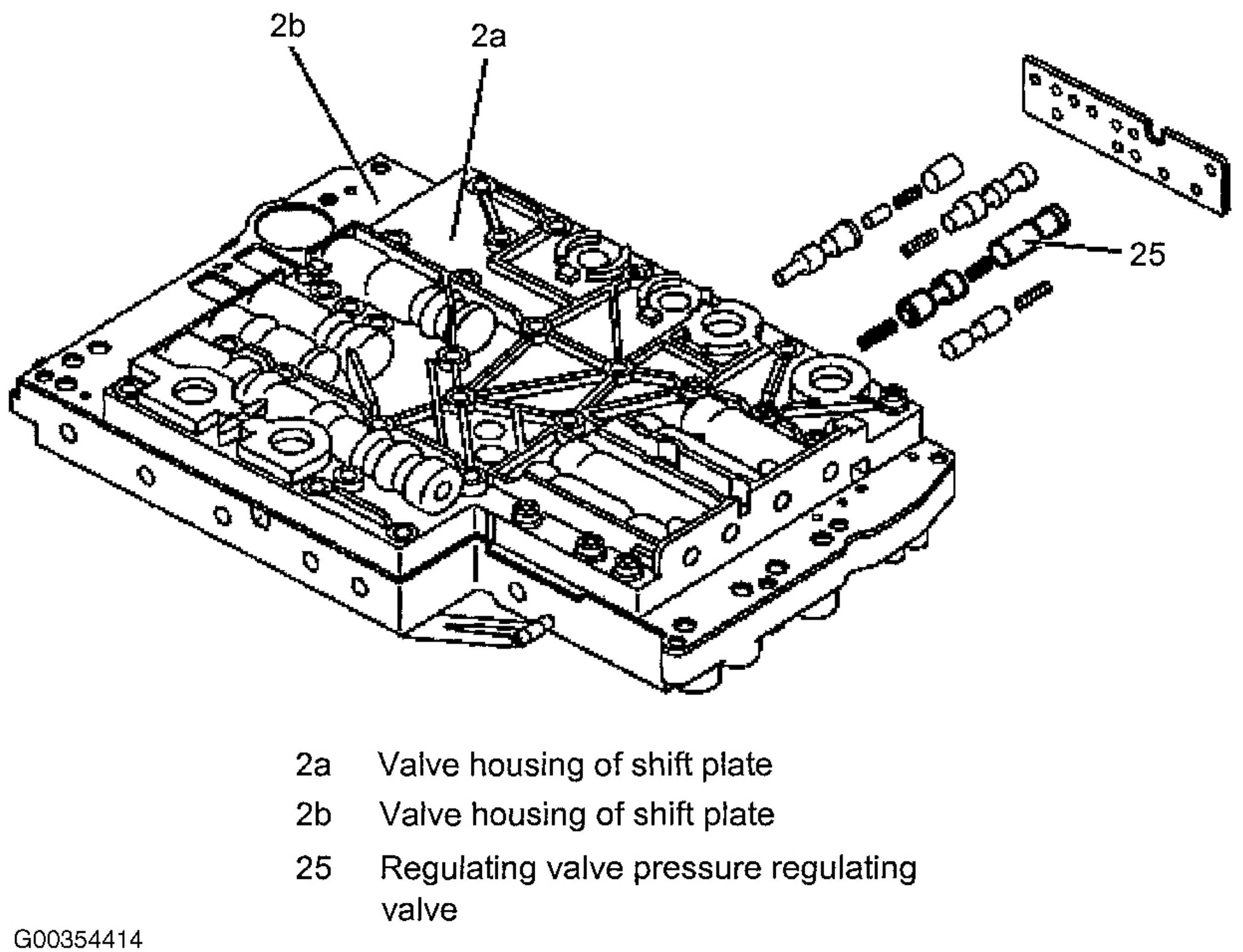


Fig. 71: Regulating Valve Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Regulating Valve Pressure Regulating Valve, Location

In the valve housing of shift plate (2b). See **Fig. 71**.

Regulating Valve Pressure Regulating Valve, Task

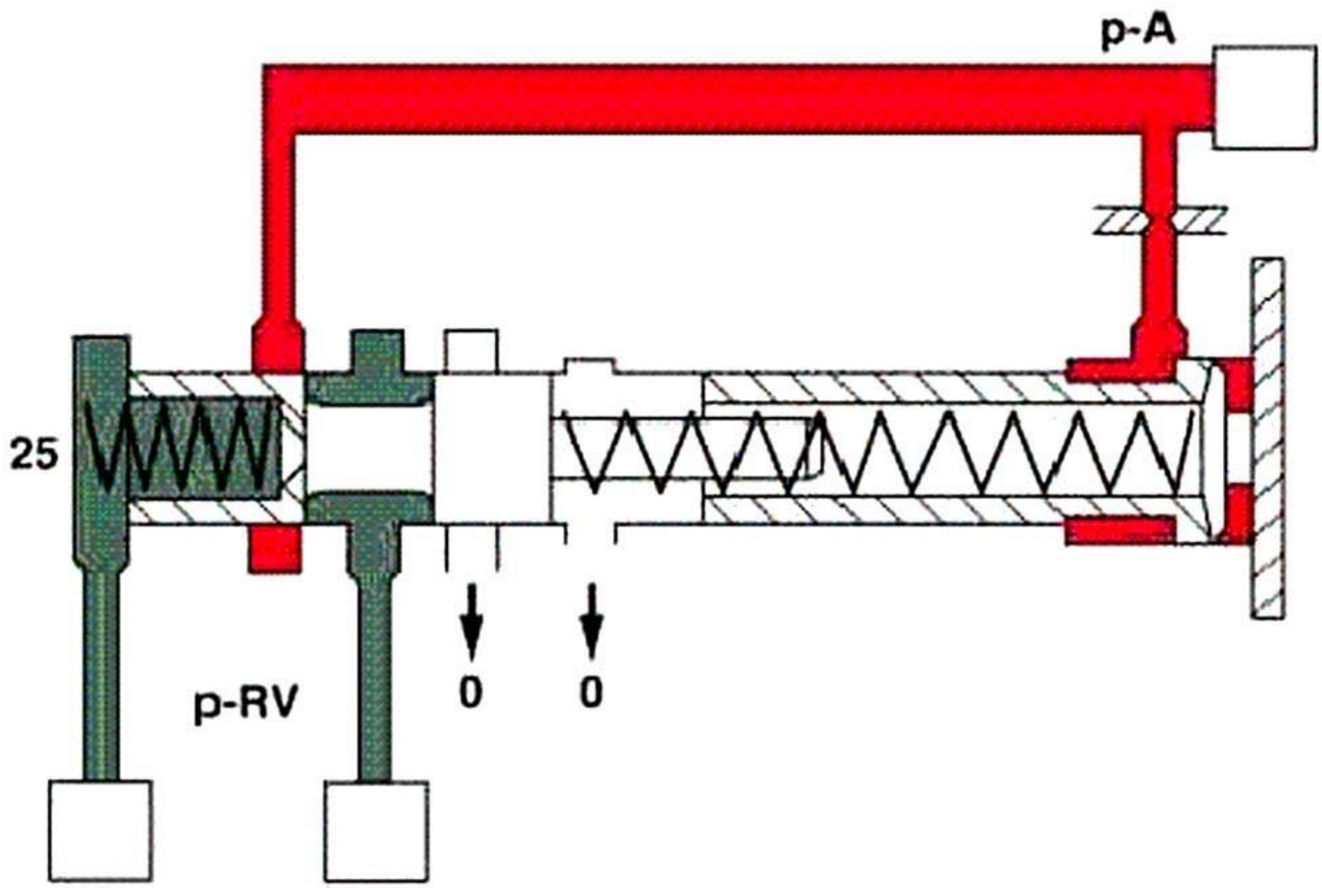
Controls the regulating valve pressures.

Regulating Valve Pressure Regulating Valve, Function

See **REGULATING VALVE PRESSURE REGULATING VALVE, FUNCTION**.

Regulating Valve Pressure Regulating Valve, Function

Operation - The regulating valve pressure (p-RV) is controlled up to the maximum pressure at the regulating valve pressure regulating valve (25) depending on the working pressure (p-A). See **Fig. 72**.



0	Oil sump drain
25	Regulating valve pressure regulating valve
p-A	Working pressure
p-RV	Regulating valve pressure

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Fig. 72: Regulating Valve Pressure Regulating Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Valve Pressure Regulating Valve, Location/Task/Function

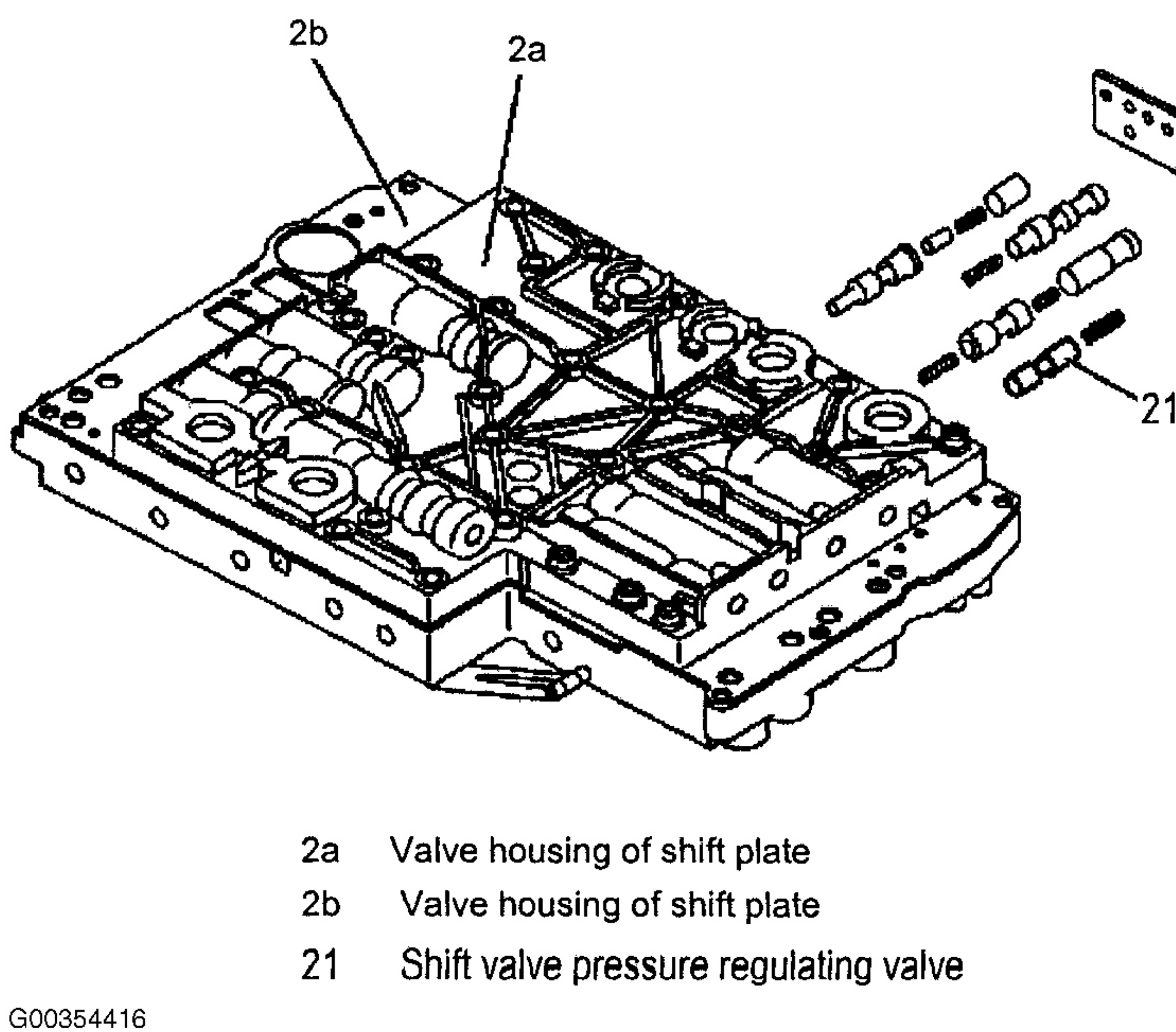


Fig. 73: Shift Valve Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Valve Pressure Regulating Valve, Location

In the valve housing of shift plate (2b). See **Fig. 73**.

Shift Valve Pressure Regulating Valve, Task

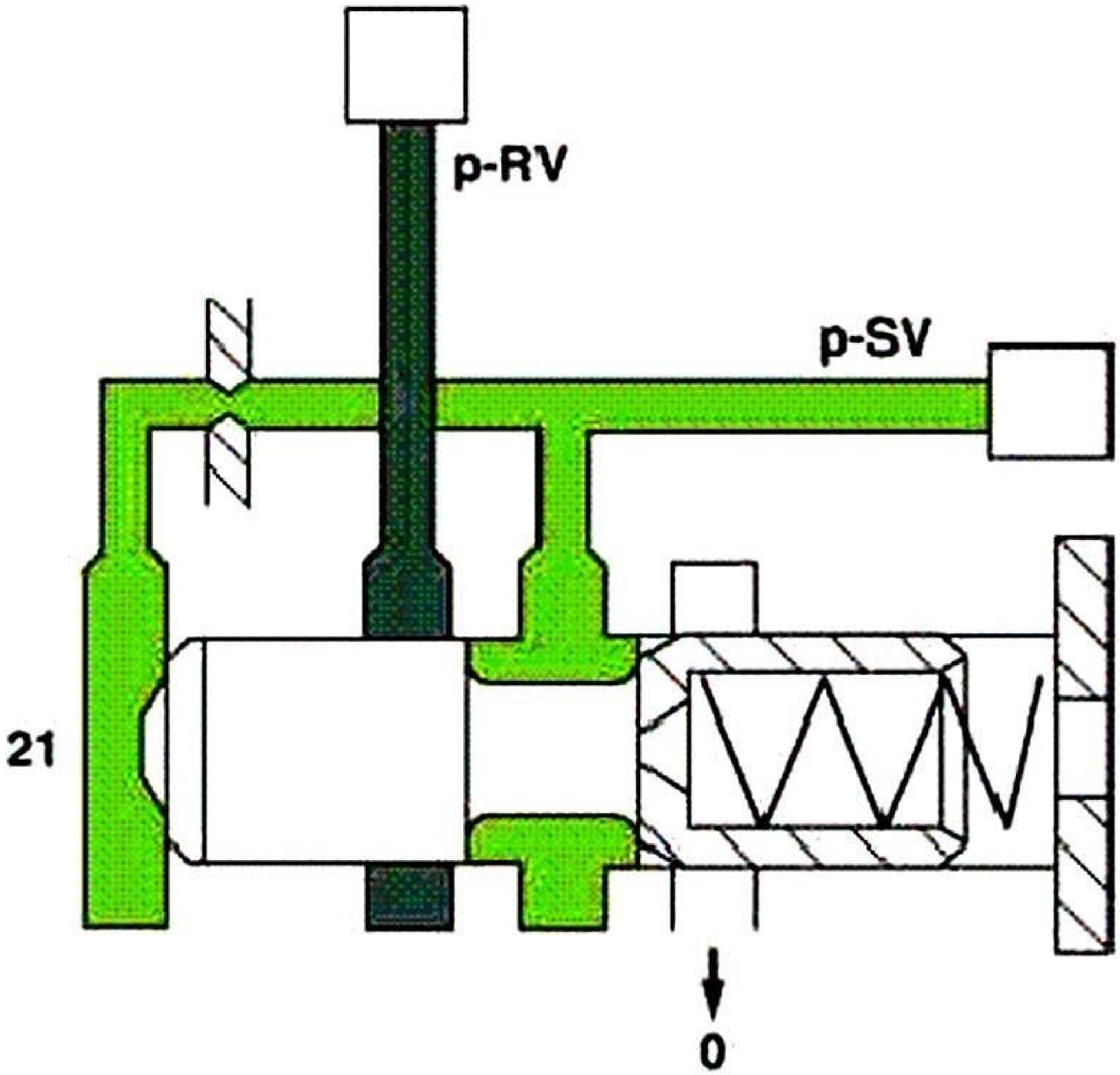
Control of shift valve pressure.

Shift Valve Pressure Regulating Valve, Function

See **SHIFT VALVE PRESSURE REGULATING VALVE, FUNCTION**.

Shift Valve Pressure Regulating Valve, Function

Operation - The variable regulating valve pressure (p-RV) is controlled to a constant shift valve pressure (p-SV) at the shift valve pressure regulating valve (21) and is used to supply the solenoid valves for 1-2 and 4-5 shift, 3-4 shift, 2-3 shift (Y3/6y3, Y3/6y4, Y3/6y5) as well as the PWM solenoid valve for the converter lockup (Y3/6y6). See **Fig. 74**.



0 Oil sump drain

21 Shift valve pressure regulating valve

p-RV Regulating valve pressure

p-SV Shift valve pressure

Fig. 74: Shift Valve Pressure Regulating Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Lubrication Pressure Regulating Valve, Location/Task/Function

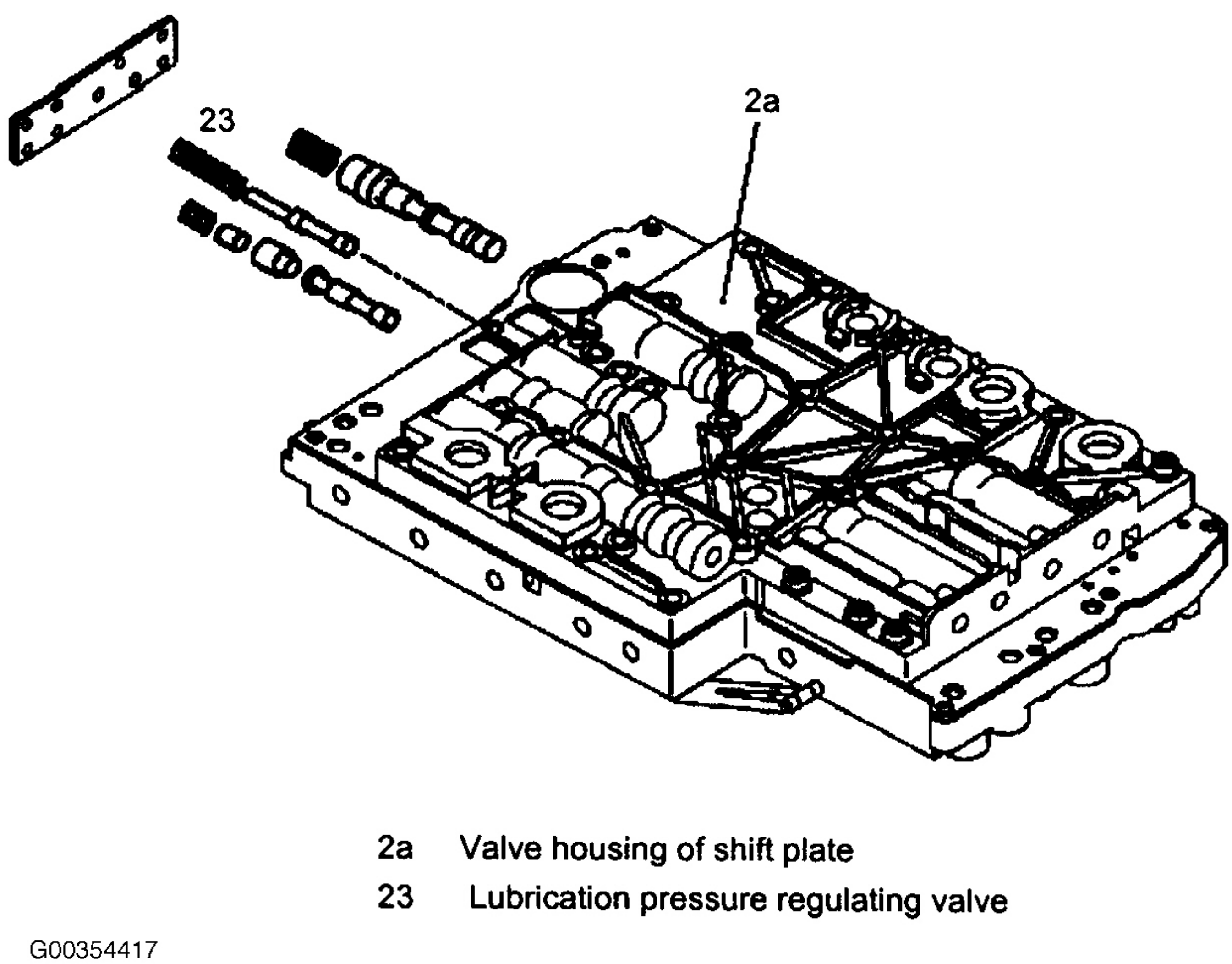


Fig. 75: Lubrication Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Lubrication Pressure Regulating Valve, Location

In the valve housing of the shift plate (2a). See **Fig. 75**.

Lubrication Pressure Regulating Valve, Task

Lubricates and cools the mechanical part of the transmission, and limits the pressure in the torque converter.

Lubrication Pressure Regulating Valve, Function

See **LUBRICATION PRESSURE REGULATING VALVE, FUNCTION**.

Lubrication Pressure Regulating Valve, Function

Operation - At the working pressure regulating valve (22) surplus oil is diverted to the lubrication pressure regulating valve (23), from were the lubrication pressure (p-Sm) is used in regulating amounts to supply the transmission lubrication system including the torque converter. See **Fig. 76**.

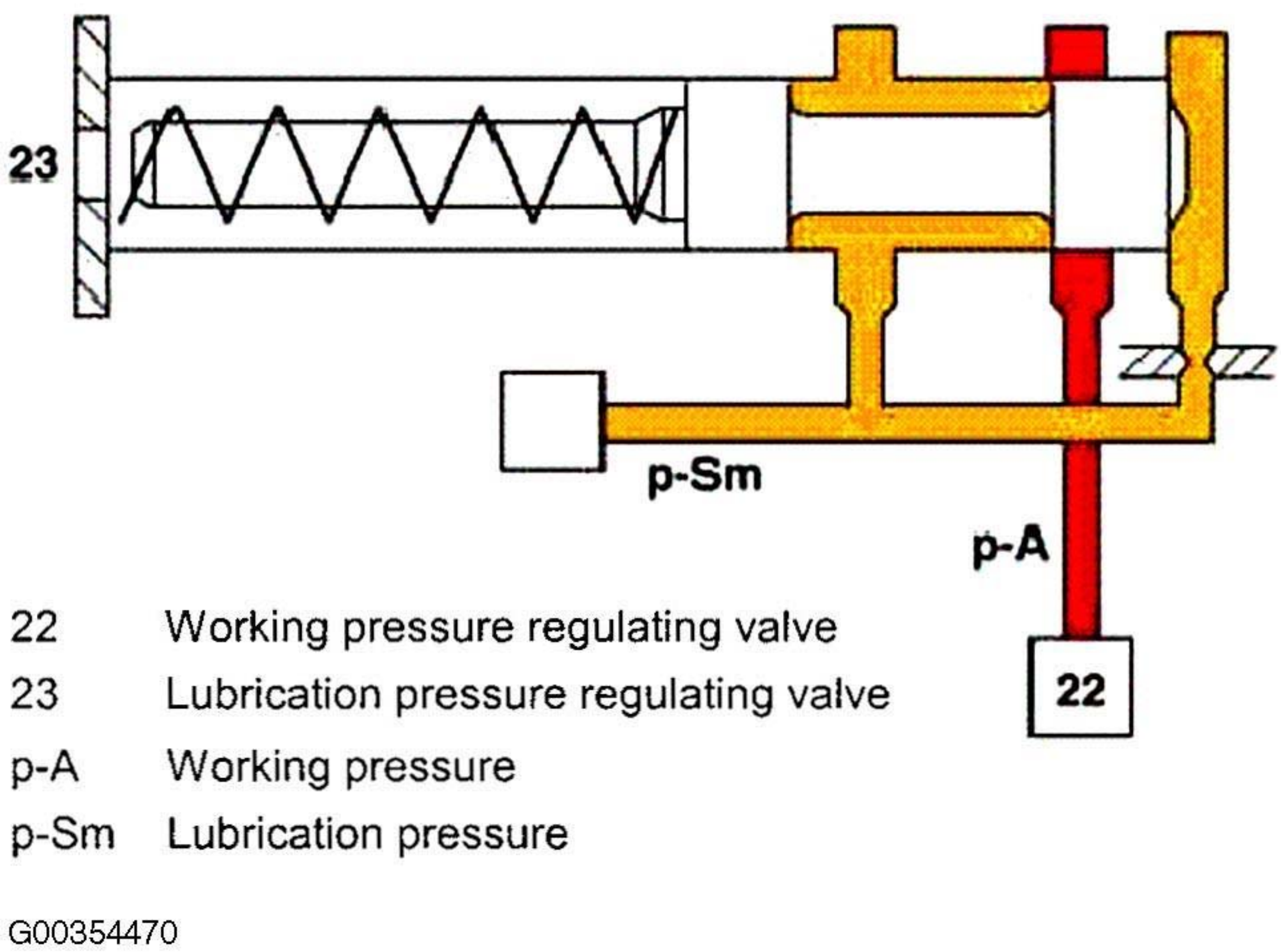


Fig. 76: Lubrication Pressure Regulating Valve, Function

Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Overlap Regulating Valve, Location/Task/Function

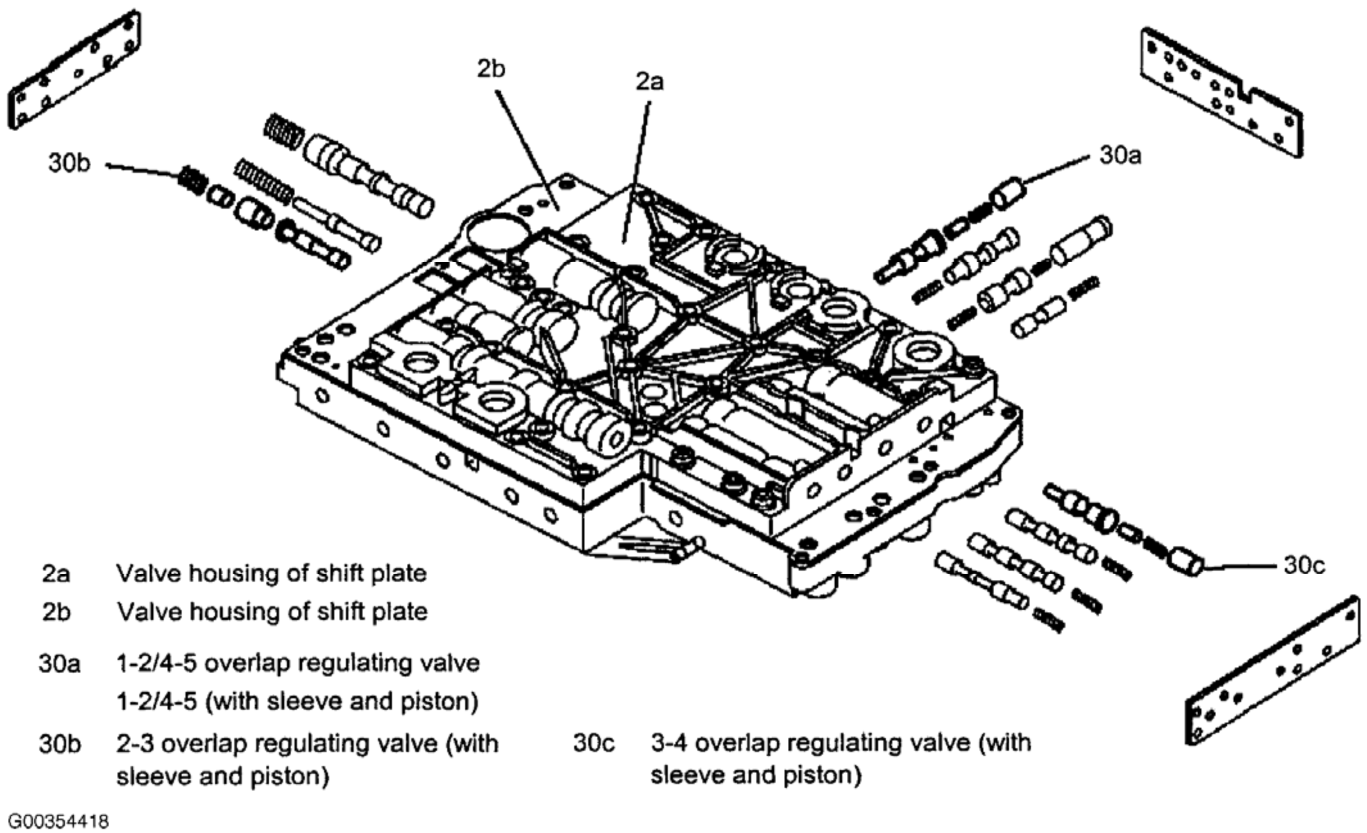


Fig. 77: Overlap Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Overlap Regulating Valve, Location

Each shift group is assigned one overlap regulating valve. The 1-2/4-5 overlap regulating valve (30a) is installed in the valve housing of the shift plate (2b), the 2-3 overlap regulating valve (30b) and 4-5 (30c) are installed in the valve housing of the shift plate (2a). See **Fig. 77**.

Overlap Regulating Valve, Location

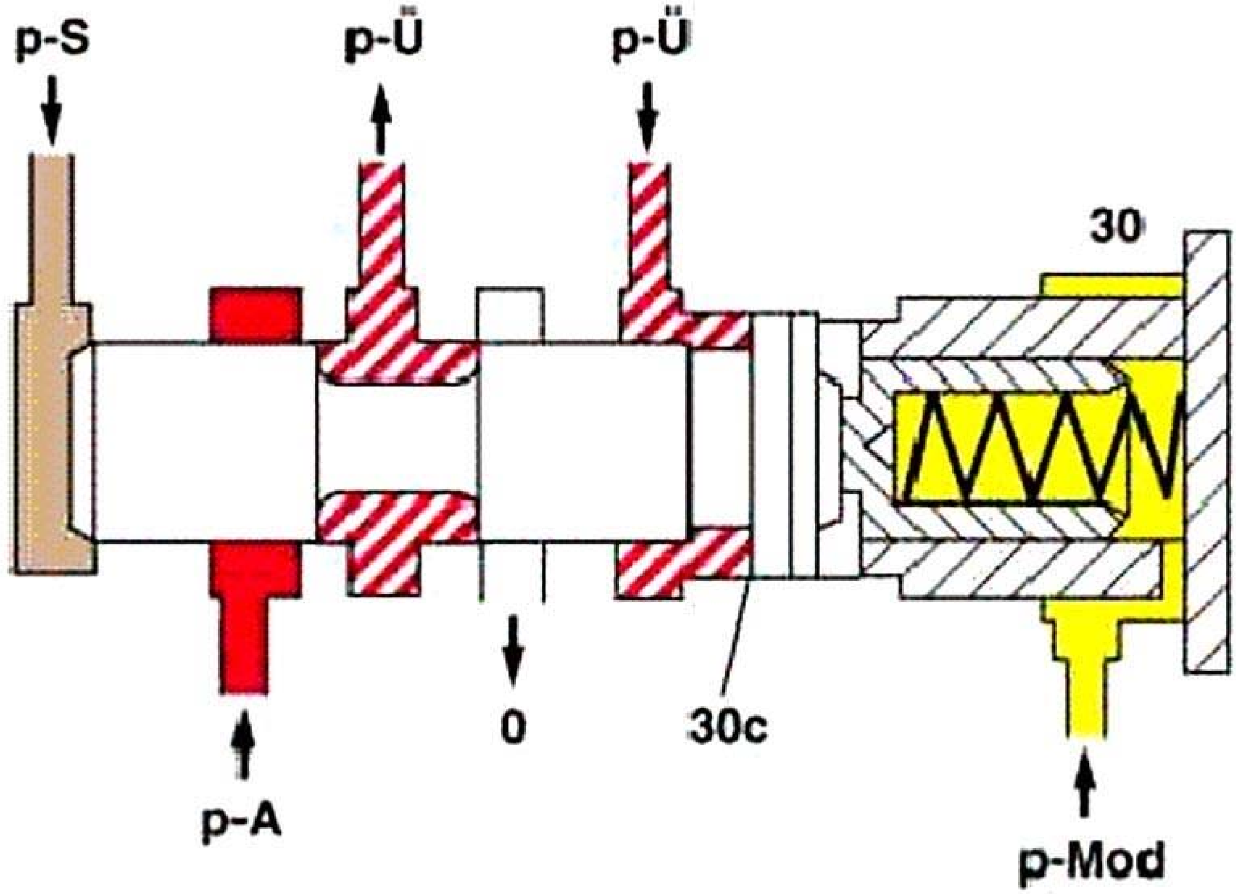
The overlap regulating valve regulates the pressure reduction during a shift phase.

Overlap Regulating Valve, Function

See **OVERLAP REGULATING VALVE, FUNCTION**.

Overlap Regulating Valve, Function

Operation - During the shift phase the pressure in the disengaging shift actuator is controlled depending on the engine load (modulating pressure (p-Mod)) and the pressure in the engaging shift actuator. The regulated pressure is inversely proportional to the transfer capacity of the activating shift actuator (regulated overlap). See **Fig. 78**.



0	Oil sump drain
30	Overlap regulating valve
30c	Annular surface on overlap regulating valve
p-A	Working pressure
p-Mod	Modulating pressure
p-S	Shift pressure
p-Ü	Overlap pressure

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Fig. 78: Overlap Regulating Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Torque Converter Lockup Clutch Regulating Valve, Location/Task/Function

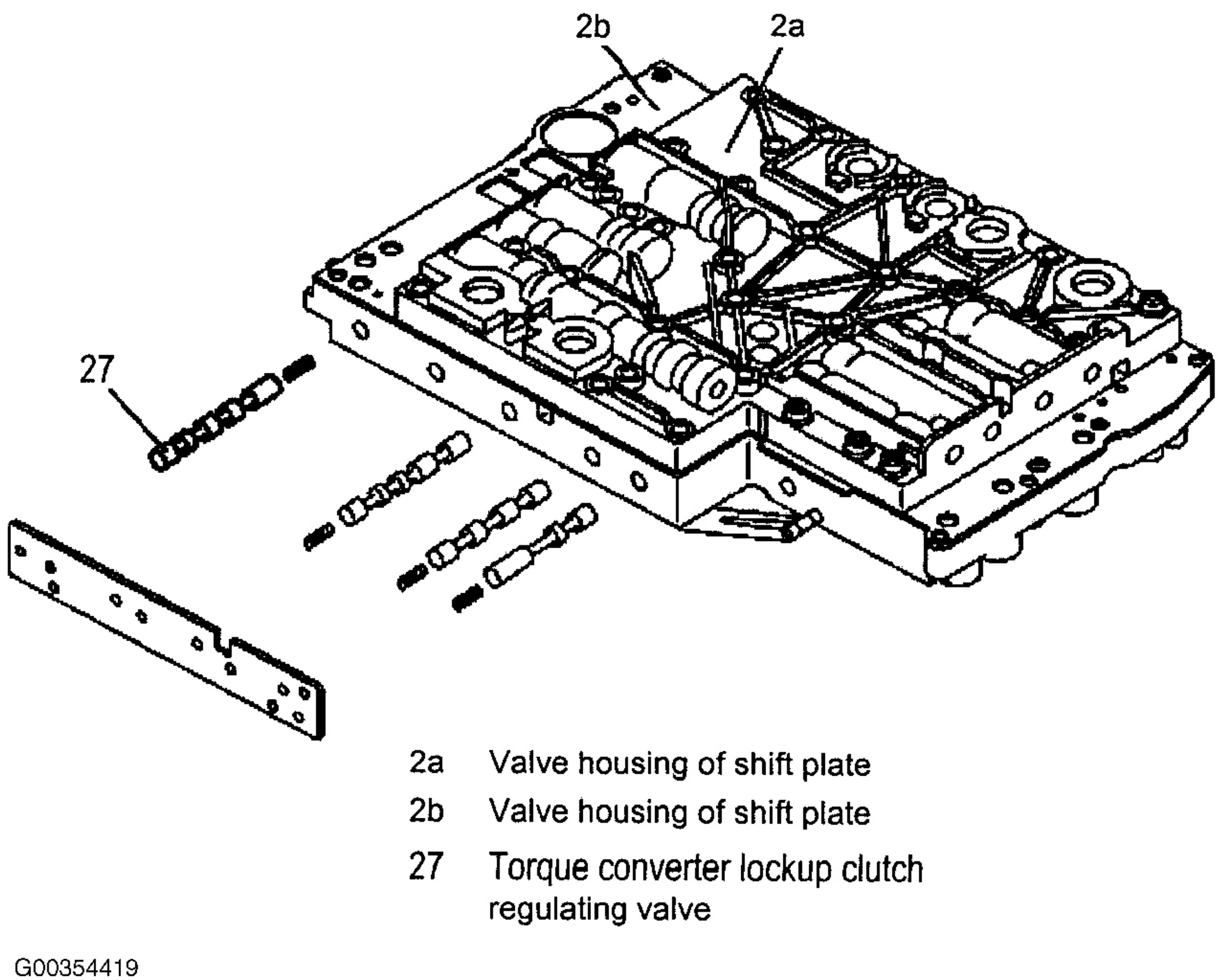


Fig. 79: Torque Converter Lockup Clutch Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Torque Converter Lockup Clutch Regulating Valve, Location

In the valve housing of the shift plate. See **Fig. 79**.

Torque Converter Lockup Clutch Regulating Valve, Task

Hydraulic control of the torque converter lockup clutch and distribution of the lubricating oil.

Torque Converter Lockup Clutch Regulating Valve, Function

See **TORQUE CONVERTER LOCKUP CLUTCH REGULATING VALVE, FUNCTION**.

Torque Converter Lockup Clutch Regulating Valve, Function

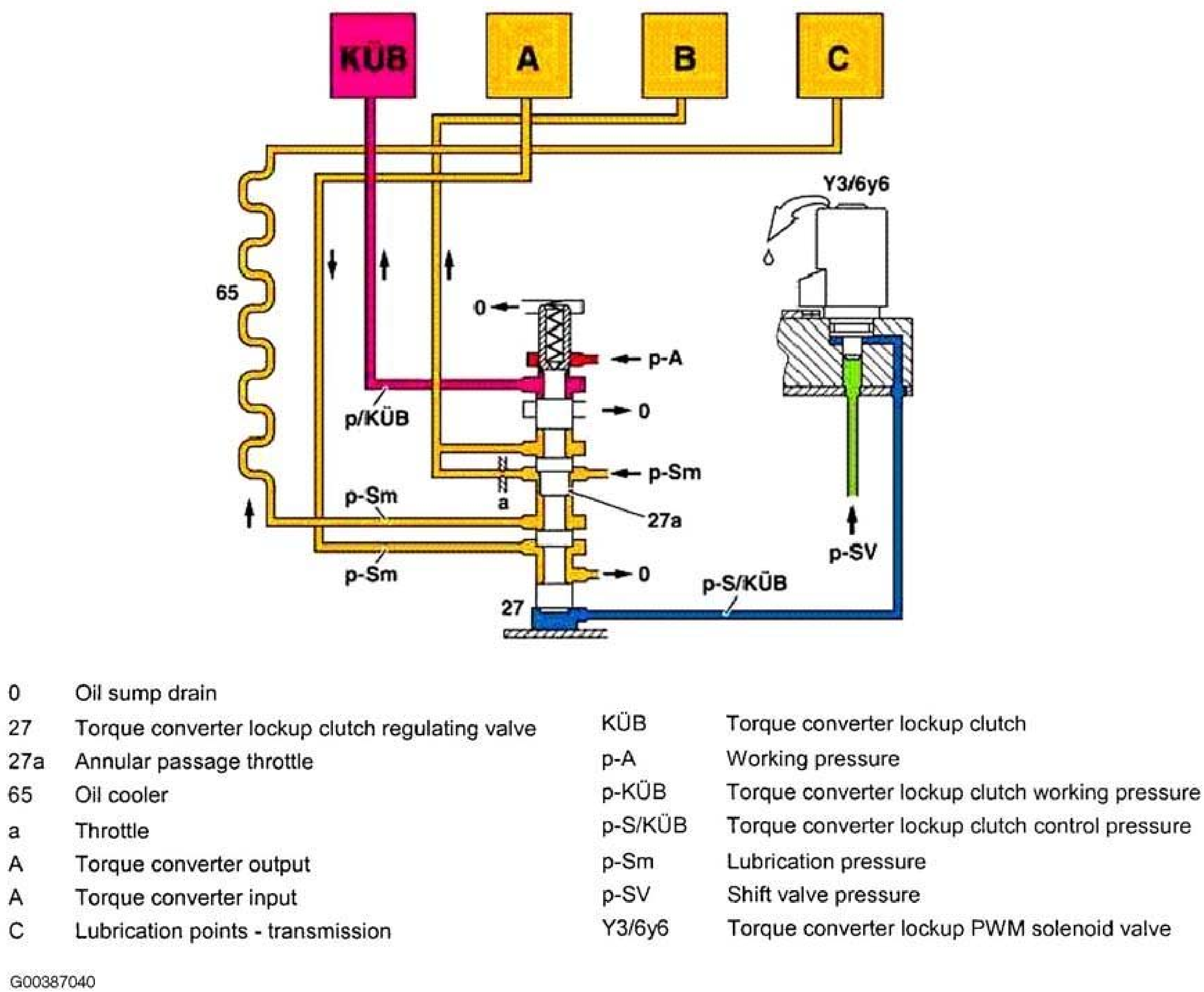


Fig. 80: Torque Converter Lockup Clutch Regulating Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - The converter lockup clutch regulating valve (27) regulates the working pressure in the converter

lockup clutch (p-KUB) depending on the control pressure in converter lockup clutch (p-S/KUB). See **Fig. 80**.

Depending on the working pressure in the converter lockup clutch (p-KUB) the converter lockup clutch (KUB) is:

- Engaged
- Disengaged
- N slip mode

In the lower position of the converter lockup clutch regulating valve (27) lubricating oil (p-Sm) flows through the torque converter and oil cooler (65) into the transmission (converter lockup clutch depressurized). In its regulating position (slipping, torque converter lockup clutch pressurized), a reduced volume of lubricating oil (p-Sm) flows through the annular passage (27a) bypassing the torque converter and passing direct through the oil cooler (65) into the transmission. The other part of the lubricating oil (p-Sm) is led via the restrictor (a) into the torque converter for cooling the converter lockup clutch (KUB).

R/P Lock, Location/Task/Design/Function

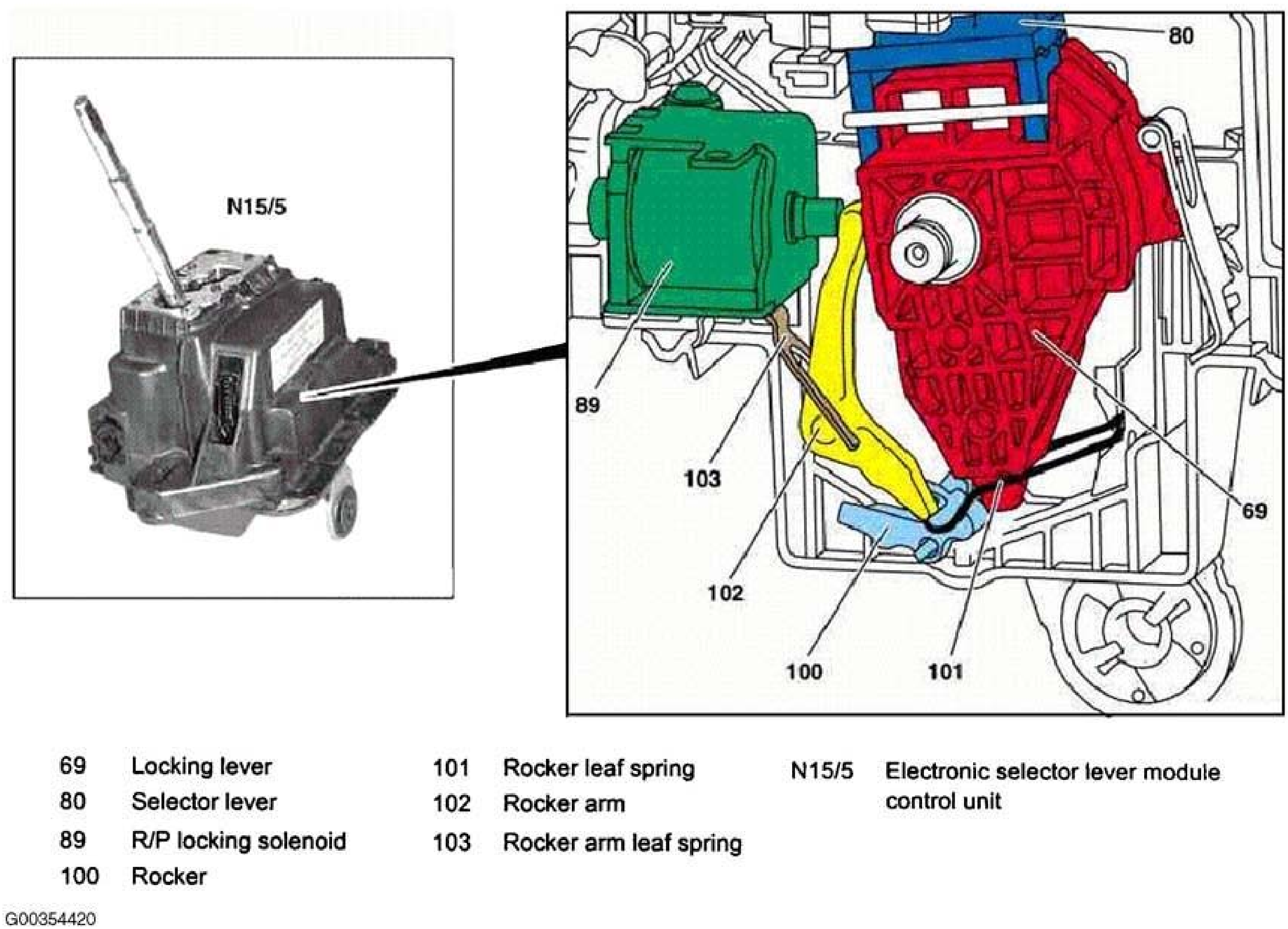


Fig. 81: R/P Lock, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

R/P Lock, Location

The R/P lock is integrated in the electronic selector lever module control unit (N15/5). See **Fig. 81**.

R/P Lock, Task

Depending on the prerequisite, the RIP-lockout prevents a shift out of selector lever position "P" or a changeover to selector lever position "R" from "N".

R/P Lock, Design

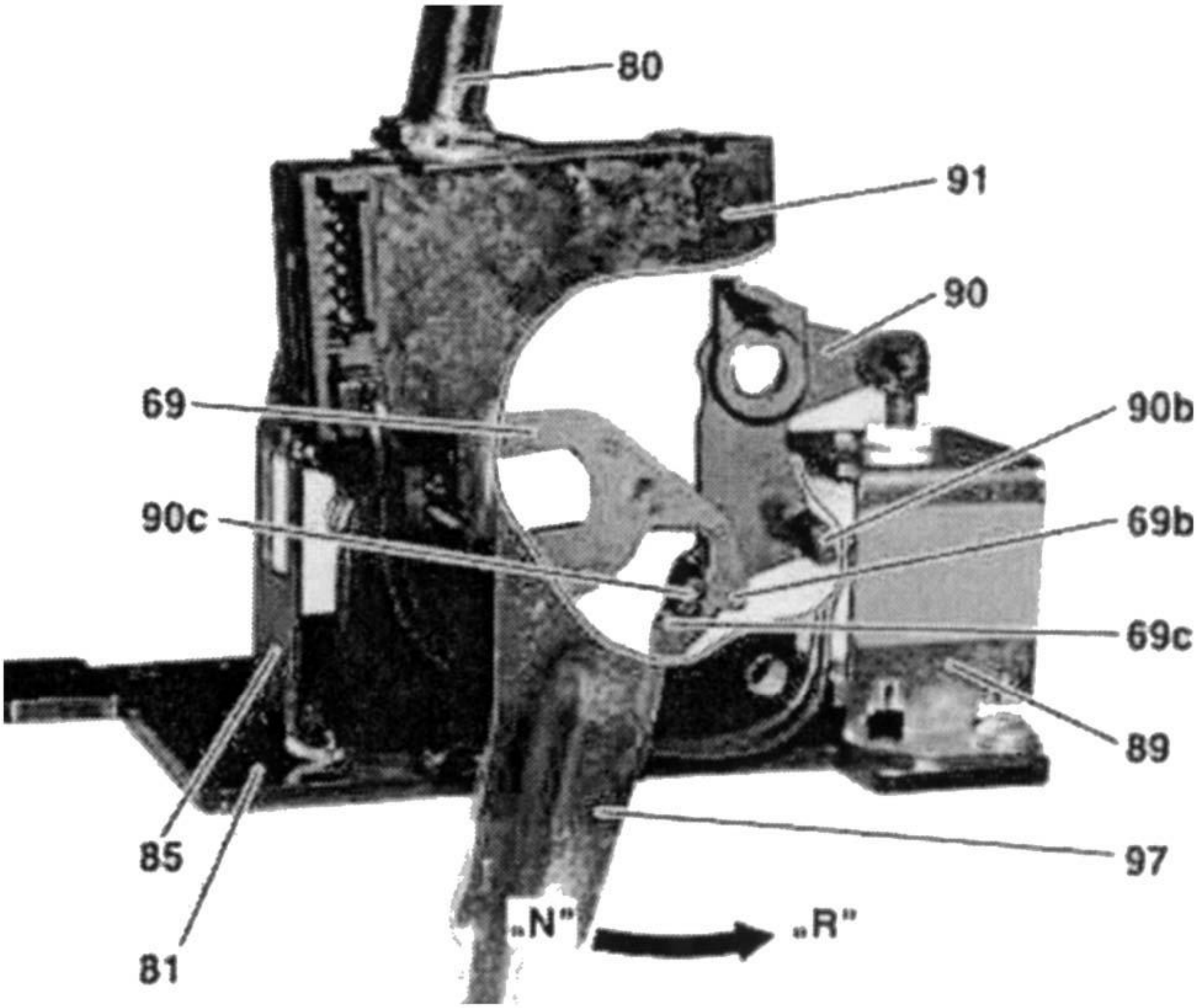
The R/P lock consists of:

- Locking lever (69)
- R/P Locking Solenoid (89)
- Rocker (100)
- Leaf Spring Of Rocker (101)
- Rocker Arm (102)
- Leaf Spring Of Rocker Arm (103)

R/P Lock, Function

See **R/P LOCK, FUNCTION**.

R/P Lock, Function

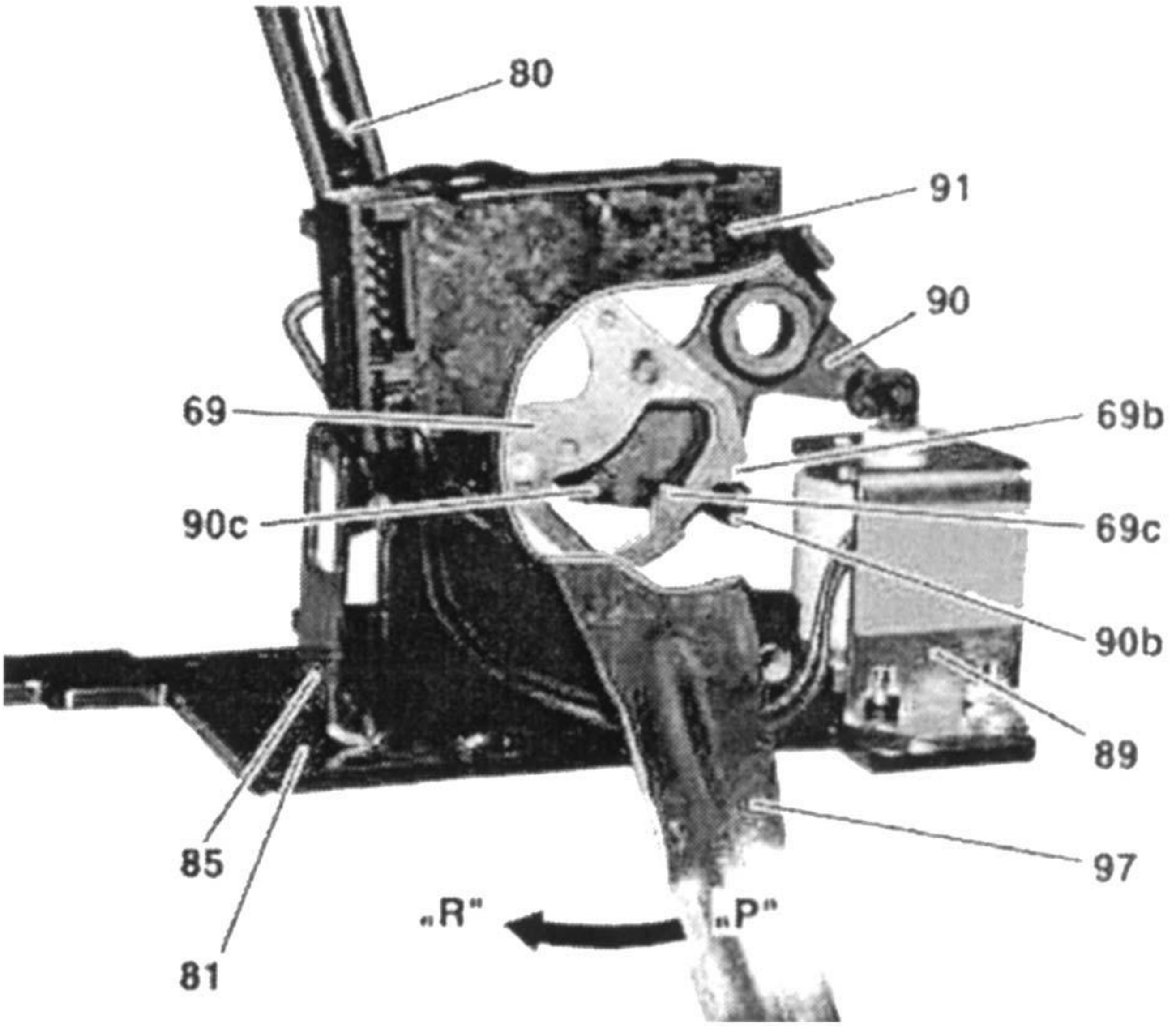


69	Locking disc	90	Locking lever
69b	Cam (P lock)	90b	Tab on lock lever (P lock)
69c	Cam (R lock)	90c	Tab on lock lever (R lock)
80	Selector lever	91	Potentiometer for recognition of selector lever position
81	base body	97	Intermediate lever
85	Left spring		
89	R/P locking solenoid		

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Fig. 82: R/P Lock, Function (Locking Position)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Function Of R/P Lock - Above a speed of approximately 10 km/h the R/P locking solenoid (89) is actuated by the electronic selector lever module control module (N15/5). See **Fig. 82**. The R/P lock lever (90) is turned to the lock position (shift from "N" to "R"). The tab on the lock lever (R lock) (90c) locks (R-lock (69c) the locking disc (69). The selector lever (80) cannot be shifted into selector lever position "R".



69 Locking disc
69b Cam (P lock)
69c Cam (R lock)
80 Selector lever
81 base body
85 Left spring
89 R/P locking solenoid
90 Locking lever
90b Tab on lock lever (P lock)
90c Tab on lock lever (R lock)
91 Potentiometer for recognition of selector lever position
97 Intermediate lever

G00391249

Fig. 83: R/P-Lock, Function (Locking Position)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Function Of R/P Lock - The selector lever position "P" is locked whenever the R/P locking solenoid (89) is not actuated by the electronic selector lever module control module (N15/5). See **Fig. 83**. The prerequisites for this are as follows:

- No voltage supply to the electronic selector lever module control module (N15/5).
- Brake pedal not depressed.

Under these conditions the locking lever (90) is in the locking position (P-lock).

The web on the locking lever (P-lock) (90b) locks the locking disc (69). It is not possible to shift the selector lever (80) out of selector lever position "P".

Shift Detent Mechanism, Location/Task/Design/Function (Without Touch Shift)

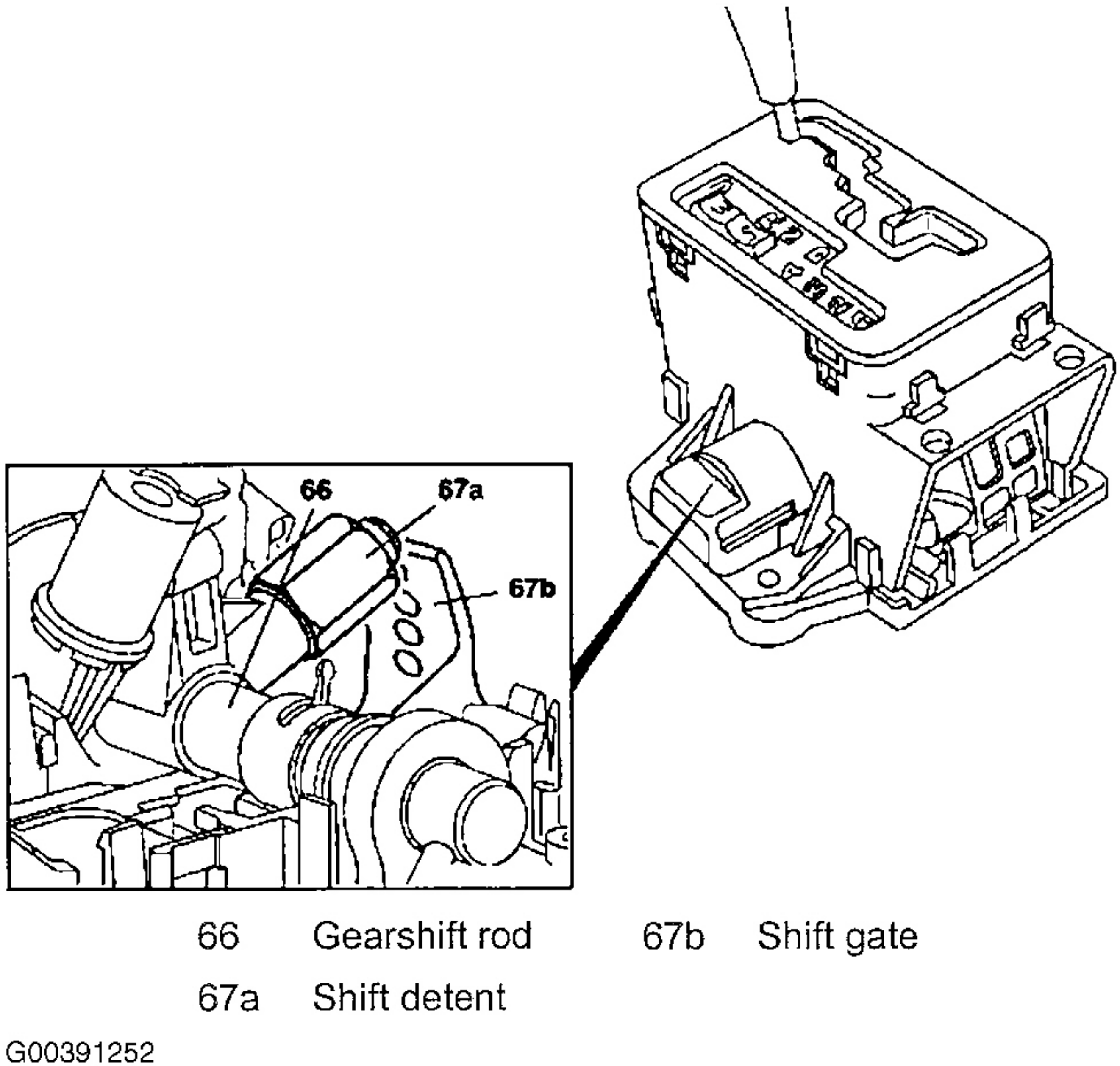


Fig. 84: Shift Detent Mechanism (Without Touch Shift)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Detent, Location

The shift detent is integrated into the floor shift. See **Fig. 84**.

Shift Detent, Task

Fixing the selector lever positions "4", "3", "2", "1".

Shift Detent, Design

The shift detent consists of a detent (67a) containing a spring-loaded ball and the shift gate (67b) with recesses arranged one under another.

Shift Detent, Function

When the selector lever is moved between the selector lever positions "4", "3", "2", "1" the shift detent (67a) locks in position in one of the four recesses in the shift gate (67b).

Shift Detent Mechanism, Location/Task/Design/Function (With Touch Shift)

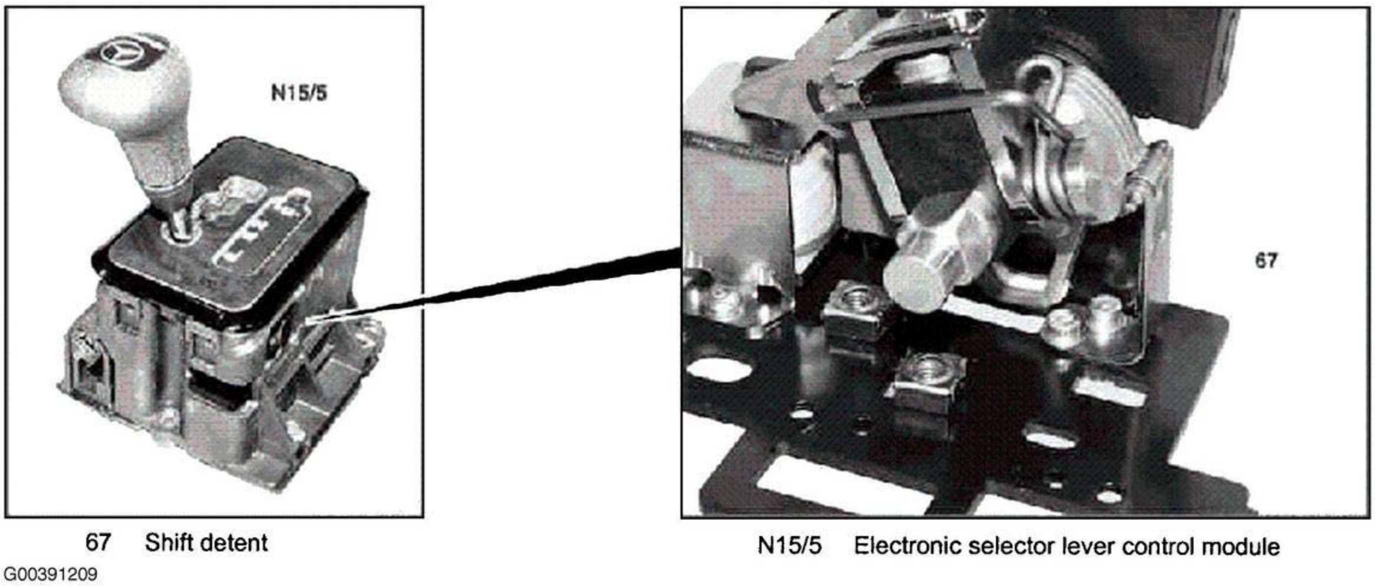


Fig. 85: Shift Detent Mechanism
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Detent, Location

The shift detent (67) is integrated in the electronic selector lever module control module (N15/5). See **Fig. 85**.

Shift Detent, Task

Fixes selector lever position "D".

Shift Detent, Design

See **SHIFT DETENT, DESIGN**.

Shift Detent, Function

See **SHIFT DETENT, FUNCTION**.

Shift Detent, Design

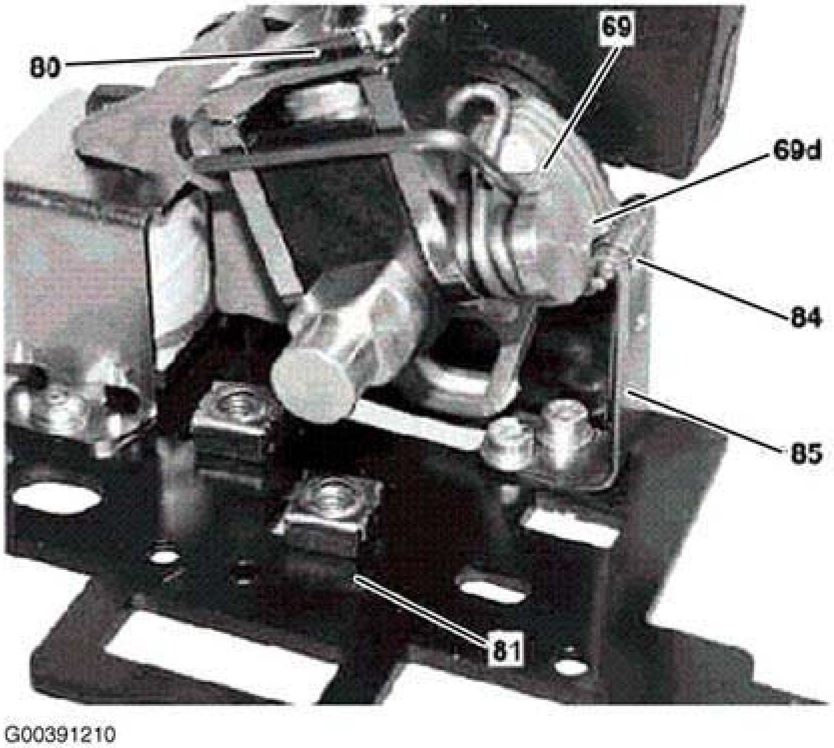


Fig. 86: Shift Detent, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Structure - The shift detent consists of:

- The Locking Disc (69) Rigidly Connected To The Selector Lever (80). See **Fig. 86**
- The Cam With Recess (69D)
- A Leaf Spring (85) Bolted Onto The Body (81)
- A Metal Roller (84) Inserted Into The Leaf Spring (85)

Shift Detent, Function

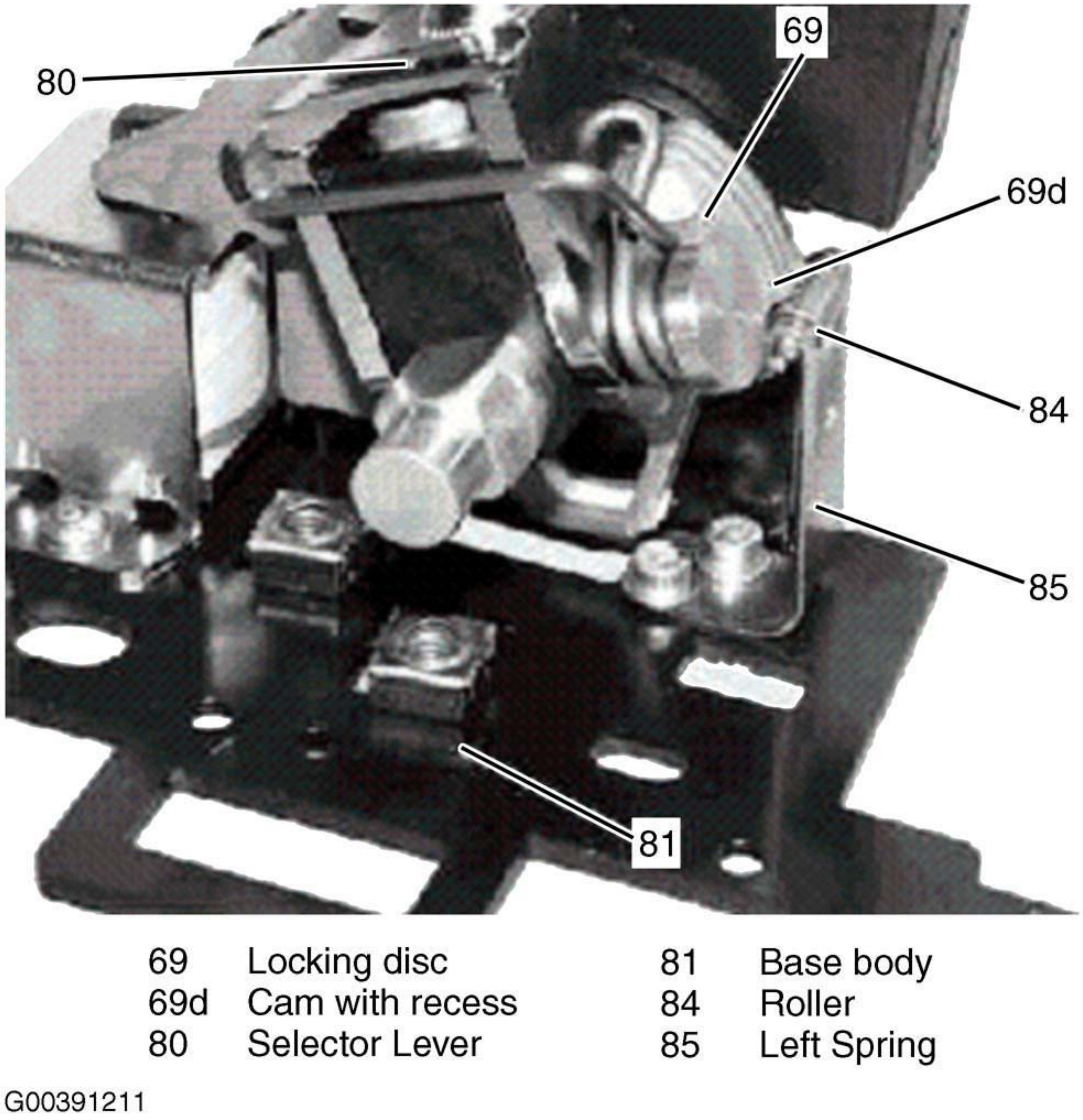


Fig. 87: Shift Detent, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - When the selector lever (80) is moved away from position "N" to position "D", the roller (84) locks in position engages in the recess (69d) in the locking disc via the cam (69). See **Fig. 87**. The selector lever (80) is locked to prevent longitudinal movement. Now it can only be shifted out of selector lever position "D" against the force of the leaf spring (85). It is still possible to move the selector lever (80) sideways (touch shift in the "+" and "-" direction).

Holding Pressure Shift Valve, Location/Task/Function

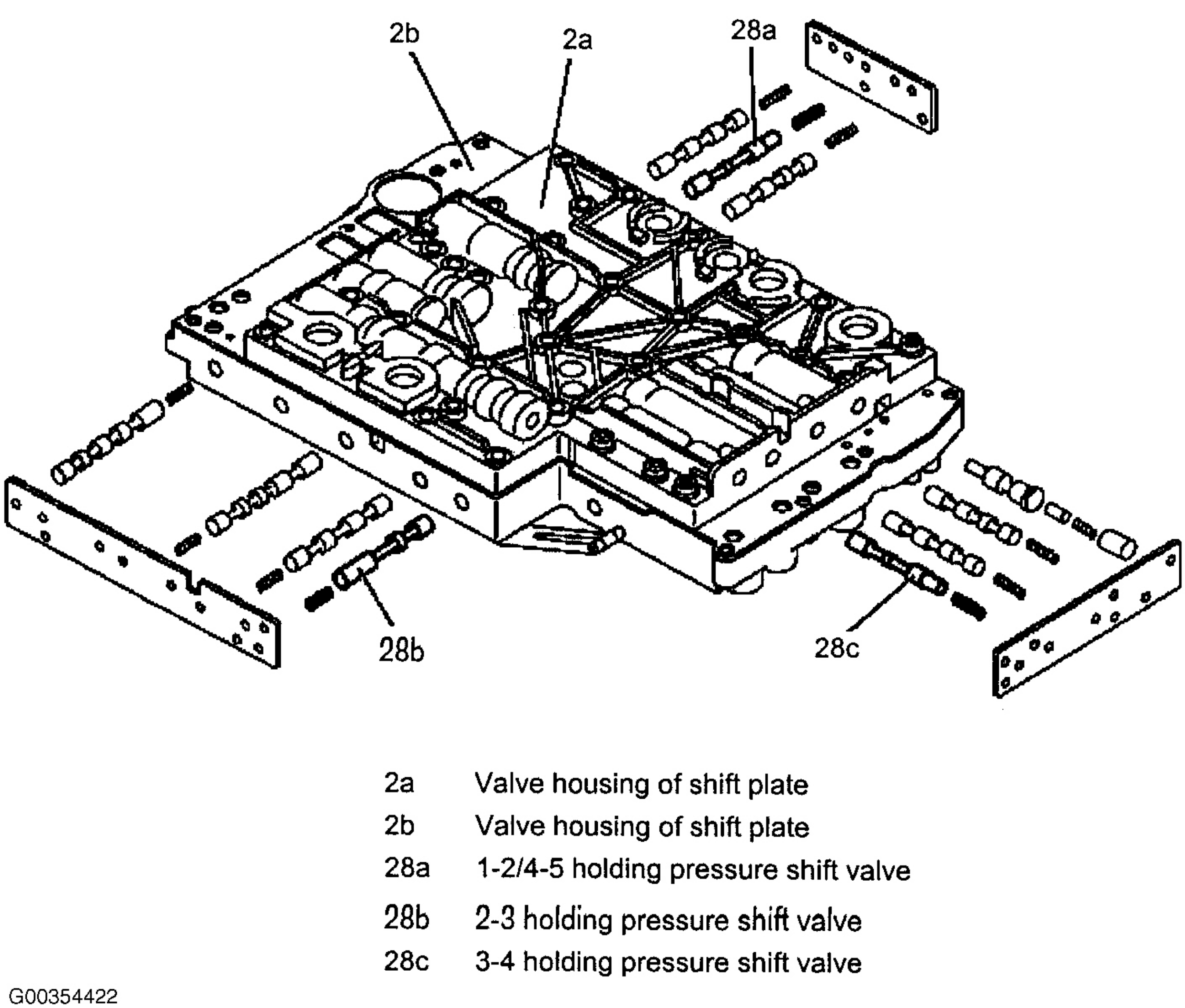


Fig. 88: Holding Pressure Shift Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Holding Pressure Shift Valve, Location

Each shift group is assigned a holding pressure shift valve (28a, 28b, 28c). See **Fig. 88**. The holding pressure shift valves 1-2/4-5 (28a) and 2-3 (28b) are installed in the valve housing (2b), the 3-4 holding pressure shift valve (28c) is installed in the valve housing of the shift plate (2a).

Holding Pressure Shift Valve, Task

Allocates the working pressure to one actuator of a shift group.

Holding Pressure Shift Valve, Function

See **HOLDING PRESSURE SHIFT VALVE, FUNCTION**.

Holding Pressure Shift Valve, Function

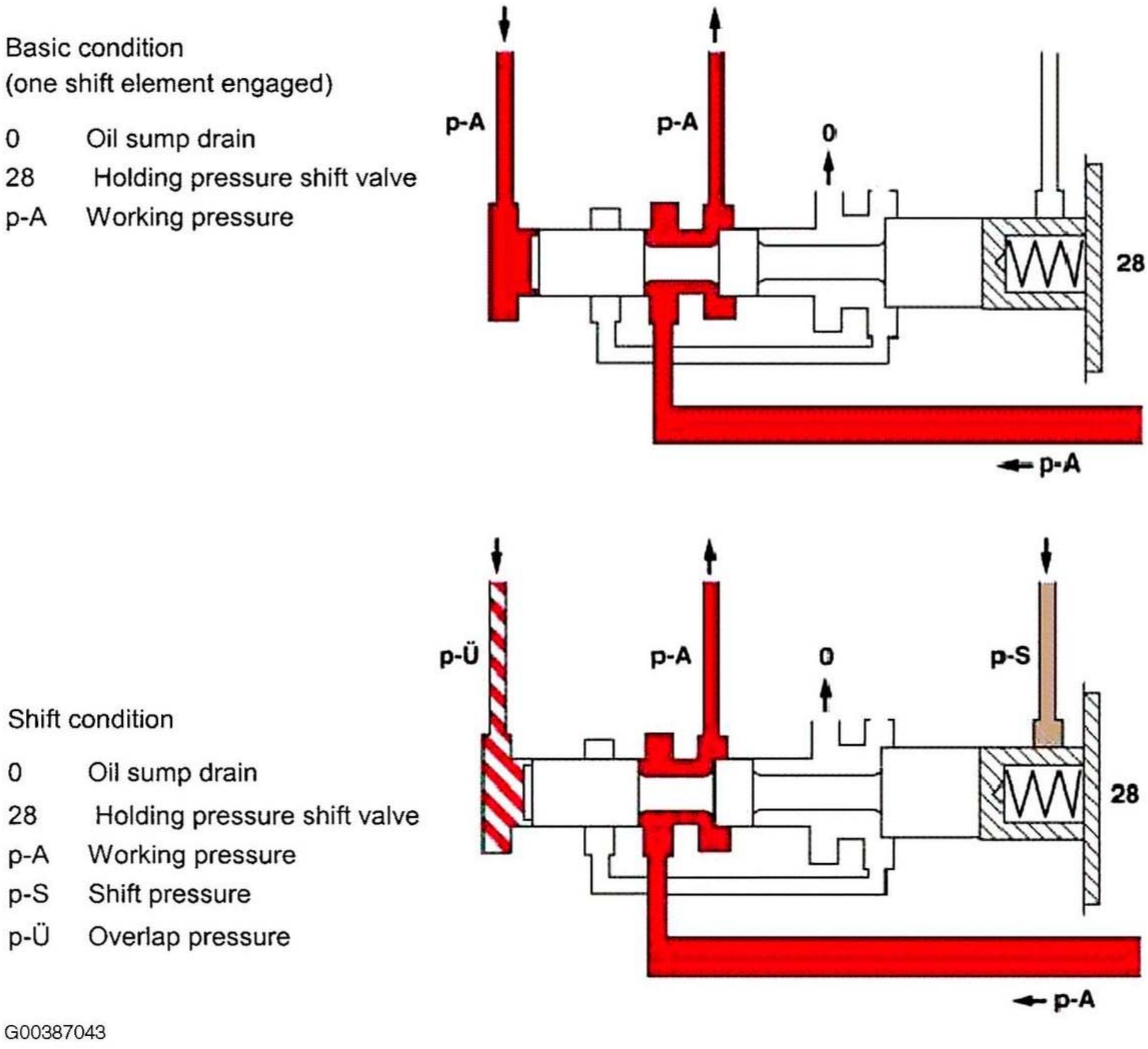


Fig. 89: Holding Pressure Shift Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - The holding pressure shift valve (28) is engaged by pressure in the shift elements acting on the front face and spring. It assigns the working pressure (p-A) to the shift element with the higher pressure (taking into account the spring force and the effective area). See **Fig. 89**.

The other element of the shift group is then unpressurized. The valve switches over only during the shift phase and only at a certain pressure ratio between the overlap pressure (p-U) and the shift pressure (p-S).

Shift Pressure Shift Valve, Location/Task/Function

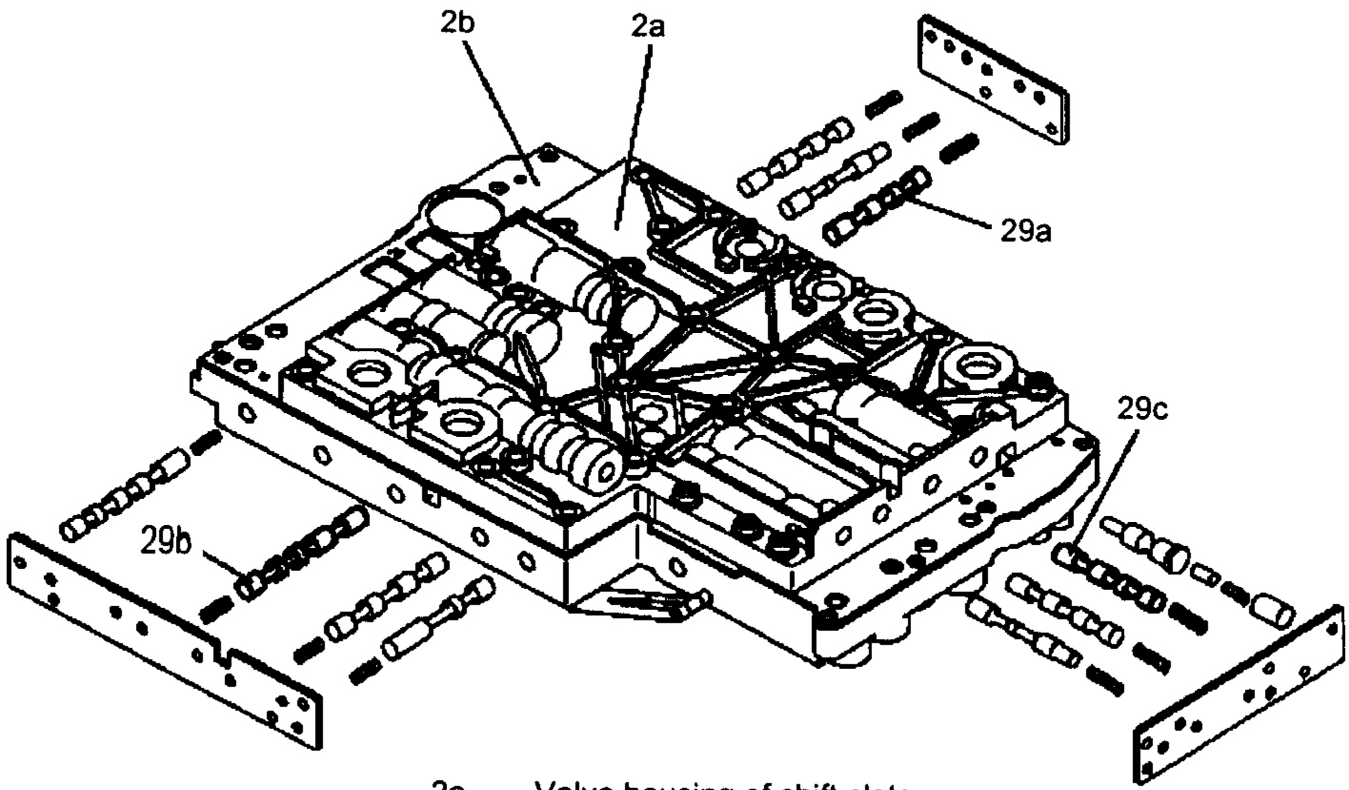


Fig. 90: Shift Pressure Shift Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Pressure Shift Valve, Location

Each shift group possesses one shift pressure shift valve. The 1-2/4-5 shift pressure shift valves (29a) and 2-3 shift pressure shift valve (29b) are installed in the valve housing of the shift plate (2b), the 3-4 shift pressure shift valve (29c) is installed in the valve housing of the shift plate (2a). See **Fig. 90**.

Shift Pressure Shift Valve, Task

To assign shift pressure to the engaging shift actuator and to assign the overlap pressure, controlled by the overlap regulating valve, to the disengaging shift actuator.

Shift Pressure Shift Valve, Function

See **SHIFT PRESSURE SHIFT VALVE, FUNCTION**.

Shift Pressure Shift Valve, Function

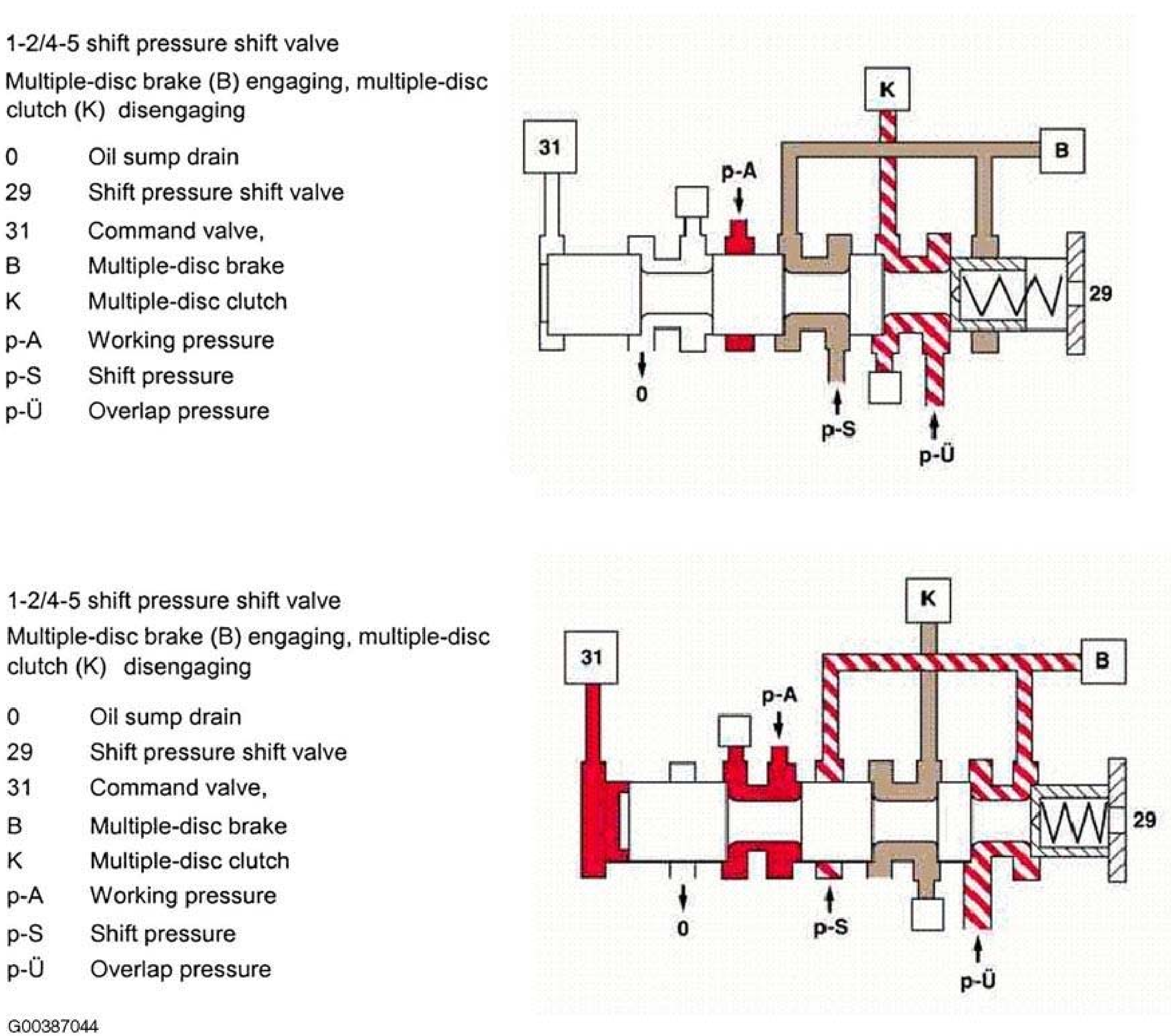


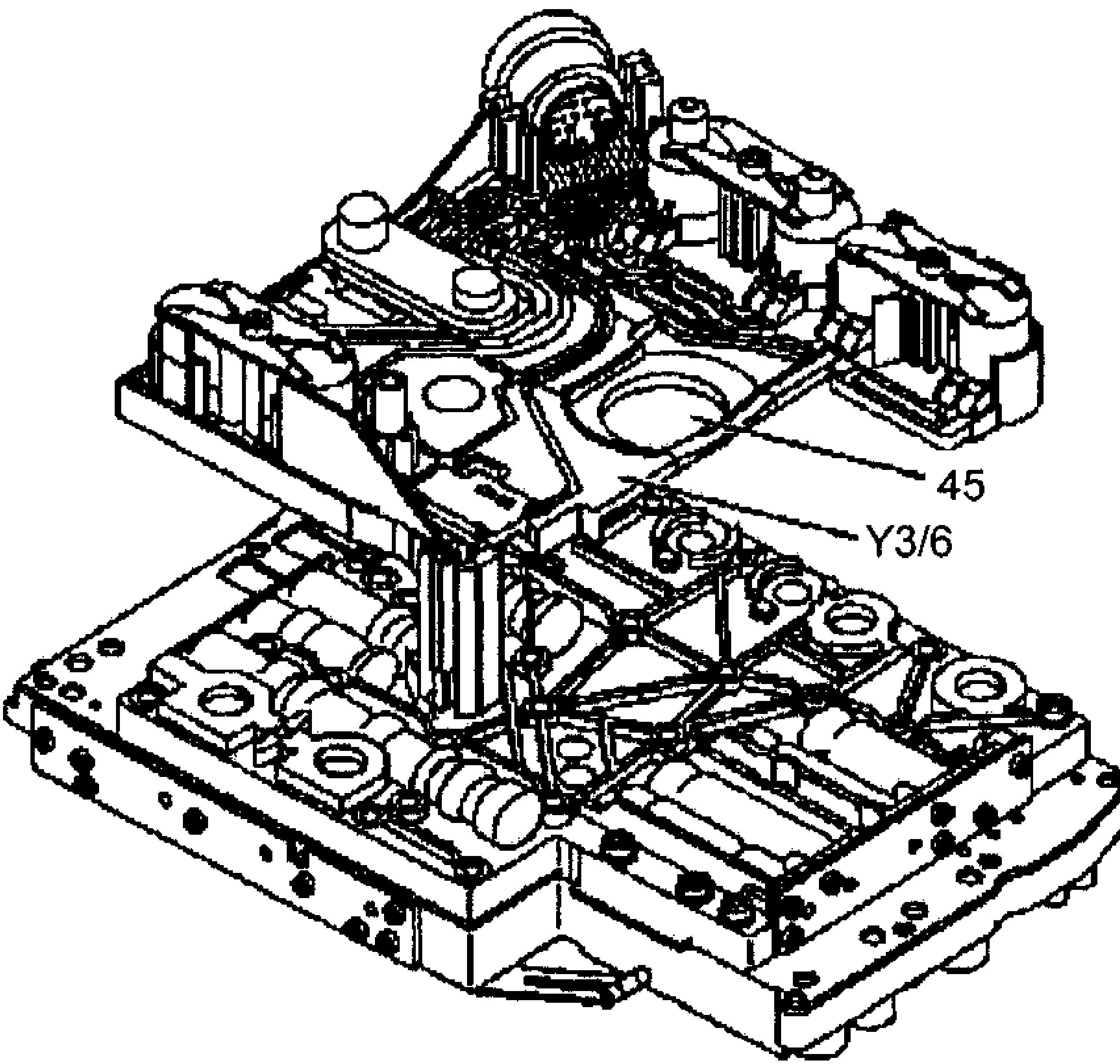
Fig. 91: Shift Pressure Shift Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation - When the multiple-disc brake (B) is engaged, the working pressure (p-A) is applied to the end face of the shift valve (29) via the command valve (31). See **Fig. 91**. Its shift condition is retained in the shift phase,

whilst the shift element pressure acting on the end face and which is variable during the shift phase is replaced by a corresponding, constant pressure.

When the multiple-disc clutch (K) is engaged (K) the end face of the shift pressure shift valve (29) is depressurized during the stationary and shift phases, here the shift condition is also retained during the shift phase.

Shift Pressure Regulating Valve, Location/Task/Function Also Float, Location/Function



45	Float
Y3/6	Electric control unit

G00354424

Fig. 92: Shift Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Float, Location

In the electrical control unit (Y3/6). See **Fig. 92**.

Float, Function

See **FLOAT, FUNCTION**.

Float, Function

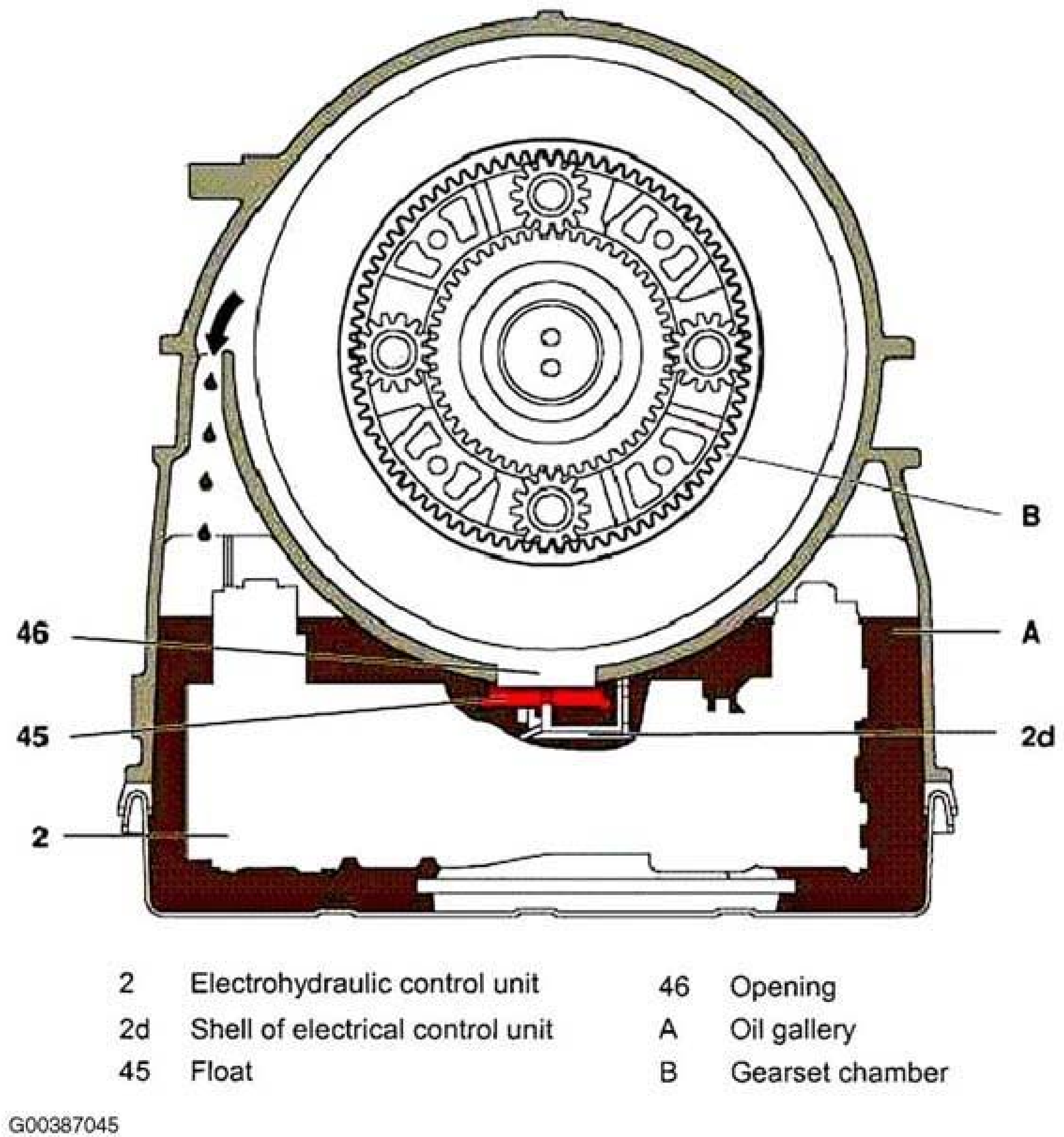


Fig. 93: Float, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Function - With low oil levels, the lubrication oil which flows constantly out of the gearset, flows back to the oil gallery (A) through the opening (46). If the oil level rises, the oil presses the float (45) against the housing. See Fig. 93.

The float (45) therefore separate the oil gallery (A) from the gearset chamber (B). The lubricating oil which continues to flow out of the gearsets is thrown against the housing wall, incorporated by the rotating parts and flows back into the oil gallery (A) through the upper opening (arrow).

ETC Control Unit, Location/Task



Fig. 94: ETC Control Unit, Location/Task
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

ETC Control Unit, Location

See **ETC CONTROL UNIT, LOCATION**.

ETC Control Unit, Task

See **ETC CONTROL UNIT, TASK (EXCEPT CODE (428A) STEERING WHEEL SWITCH BUTTONS)**.

ETC Control Unit, Location

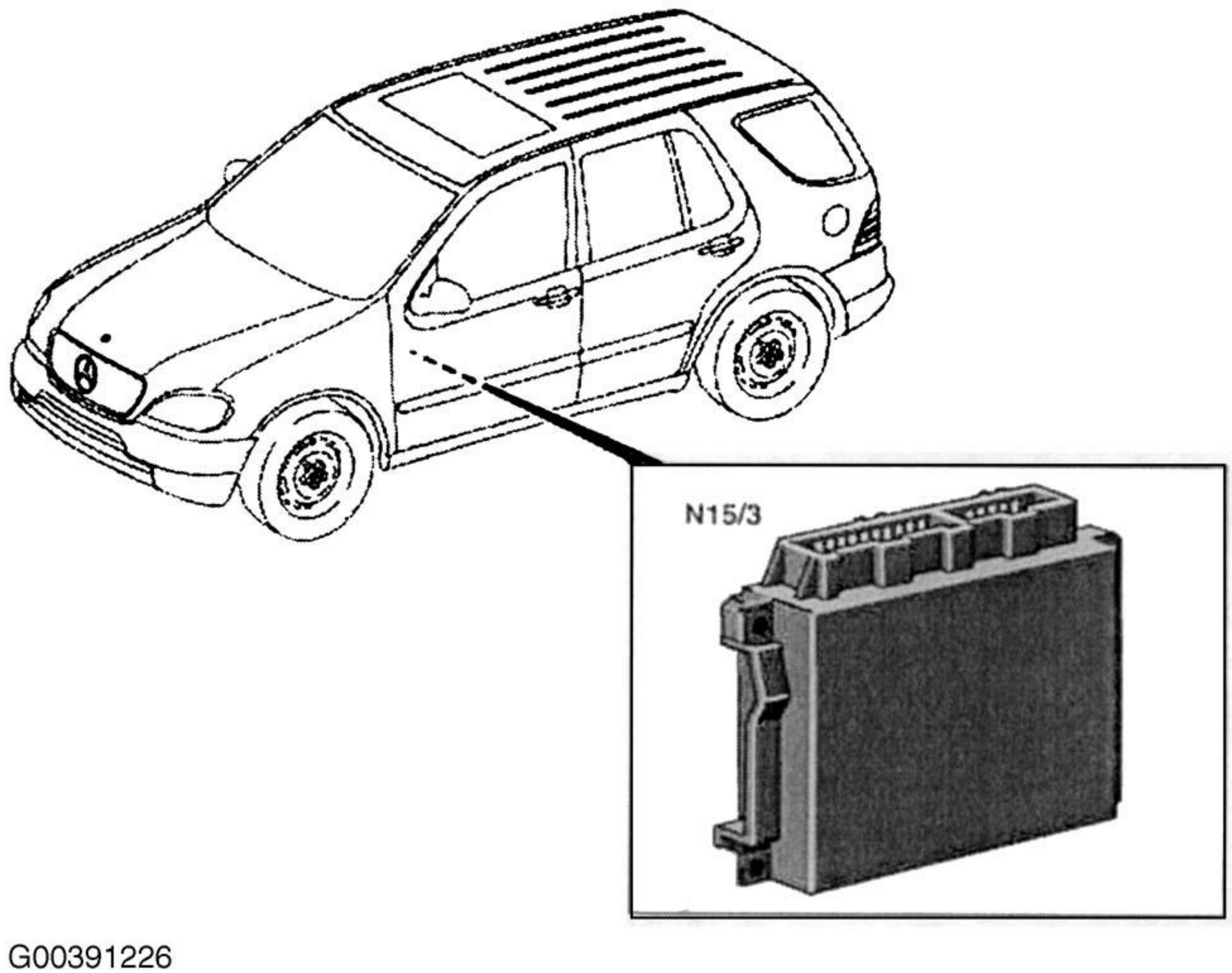


Fig. 95: ETC Control Module, Location
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Location - The ETC control module (N15/3) is installed in the left footwell, on the heater/air conditioning housing. See **Fig. 95**.

ETC Control Unit, Task

Transmission 722.6 in model 163 with touch shift

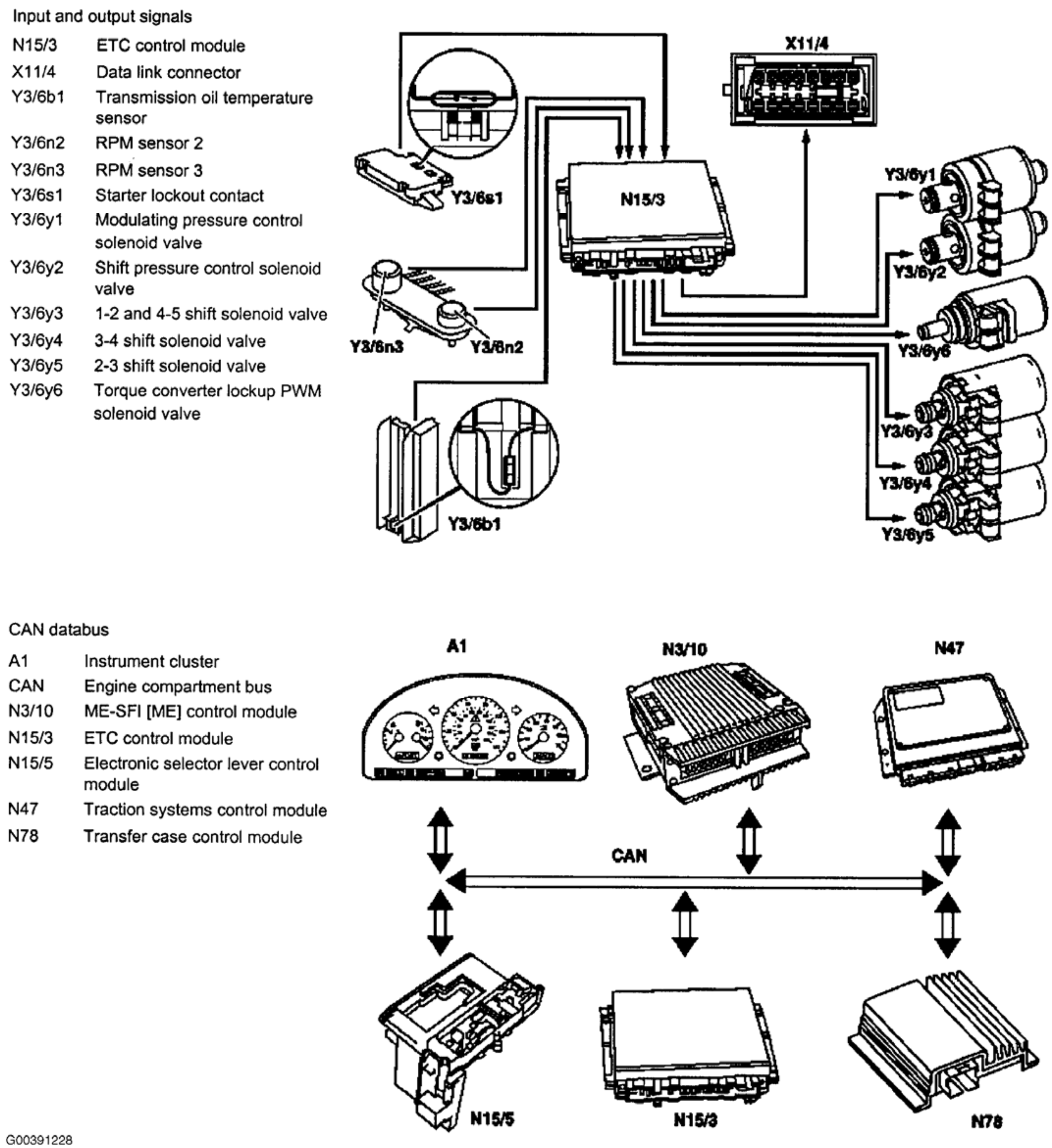


Fig. 96: ETC Control Module, Task With Touch Shift
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Task - The ETC control module (N15/3) determines the instantaneous operating condition of the vehicle and controls all gearshift sequences taking into account the ease of shifting and the driving situation. This involves receiving, converting and transmitting various digital and analog signals. See **Fig. 96**.

It receives operating data in the form of input signals from:

- Starter Lock-Out Contact (Y3/6S1)
- RPM Sensor 2 (Y3/6N2)
- RPM Sensor 3 (Y3/6n3)
- Transmission Oil Temperature Sensor (Y3/6B1)

In addition there is a connection via the engine compartment bus to the:

- Instrument Cluster (A1)
- ME-SFI Control Module (N3/10) or CDI Control Module (N3/9)

The solenoid valves for the modulating and shift pressure and for the gear changes are actuated by the ETC control module (N15/3).

The pressure required is calculated from all input signals, adjusted to the torque to be transferred. The following information from other systems is then processed.

ME-SFI Control Module (N3/10) or CDI Control Module (N3/9):

- Engine Torque
- Engine Speed
- Accelerator Pedal Position
- Gear Shift
- Engine Status

Electronic Selector Lever Module Control Module (N15/5):

- Kickdown Switch (S16/6)
- Selector Lever Position P/N

Traction System Control Module (N47):

- Transmission Ratio
- Speeds

Instrument Cluster (A1):

- Selector Lever Position/Shift Range

ETC Control Unit, Task (Without Touch Shift)

Transmission 722.6 in Model 163 Without Touch Shift

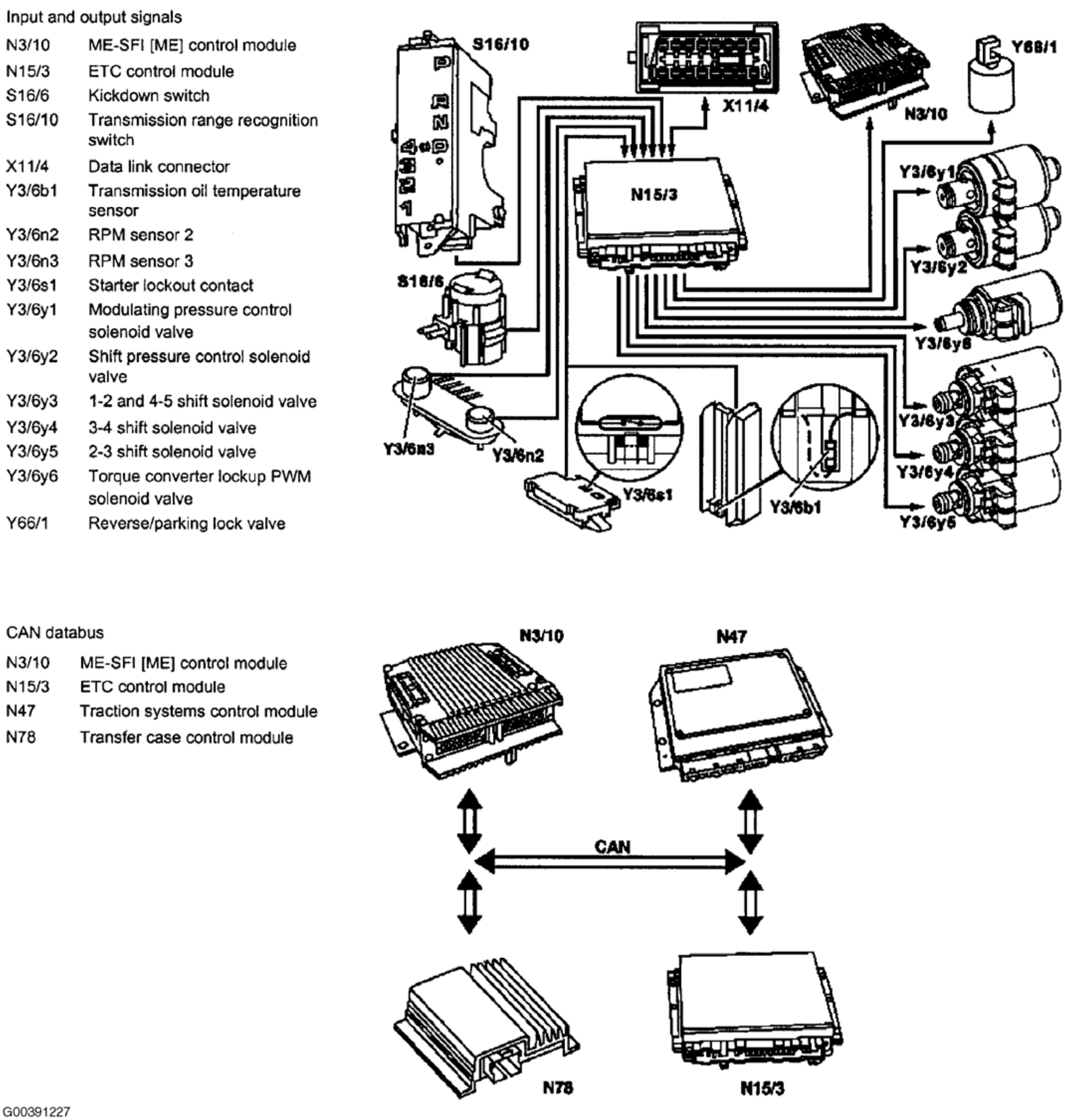


Fig. 97: ETC Control Module without Touch Shift

Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Task - The ETC control module (N15/3) determines the instantaneous operating condition for the vehicle and controls all gearshift sequences taking into account the ease of shifting and the driving situation. See **Fig. 97**. This involves receiving , converting and transmitting various digital and analog signals.

Input signals:

Starter Lock-Out Contact (Y3/6S1)
RPM Sensor 2 (Y3/6N2)
RPM Sensor 3 (Y3/6N3)
Transmission Oil Temperature Sensor (Y3/6B1)
Kickdown Switch (S16/6)
Gear Recognition Switch (S16/10)

Output signals:

- Reverse/parking lock valve

Input and output signals:

- Datalink connector (X11/4)

In addition there is a connection via the engine compartment bus to the:

- ME-SFI Control Module (N3/10) or CDI Control Module (N3/9)
- Traction System Control Module (N47)
- Transfer Case Control Module (N78)

The solenoid valves for the modulating and shift pressure and for the gear changes are actuated by the ETC control module (N15/3). The pressure required is calculated from all input signals, adjusted to the torque to be transferred.

The following information from other systems is then processed:

- ME-SFI Control Module (N3/10) or CDI Control Module (N3/9)
- (Y66/1)
- Selector lever position P/N to the engine control module (ME-SFI) (N3/10) (only on detection of the selector lever position "P" or "N" on the transmission range recognition switch (S16/10) and at the starter interlock contact (Y3/6s1)).

Traction system control module (N47):

- Wheel speeds

- Gear shift
- Traction status

Transfer case control module (N78):

- Position of transfer case (off-road or on-road ratio)
- Engine torque
- Engine speed
- Accelerator pedal position
- Gear soft
- Engine status

The following information is output to other systems:

ME-SFI Control Module (N3/10) or CDI Control Module (N3/9):

- Kickdown switch (S16/6)
- Engage drive mode

Traction system control module (N47):

- Transmission ratio
- Speeds

Electronic Selector Lever Module Control Module, Location/Task/Design (With Touch Shift)

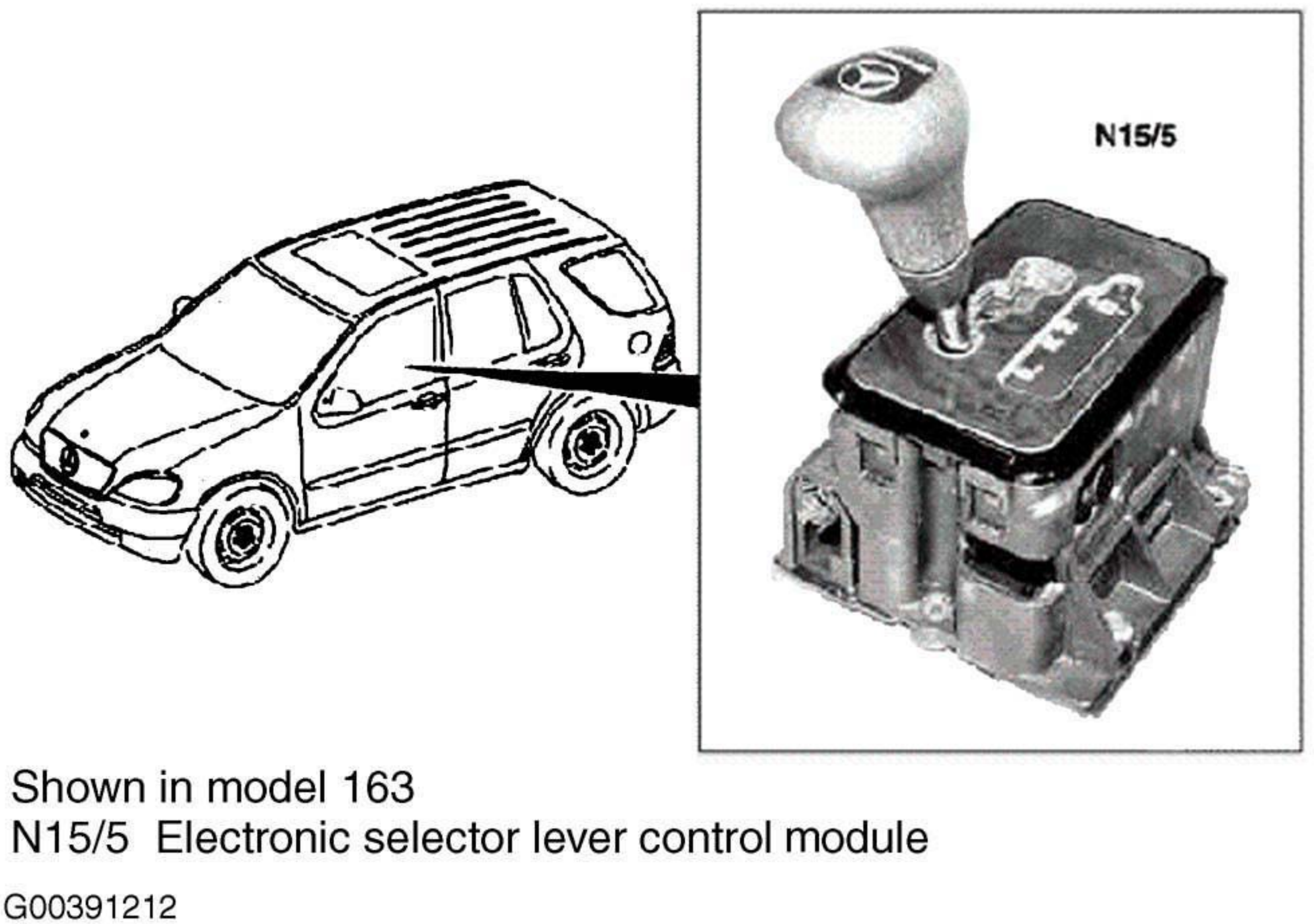


Fig. 98: Electronic Selector Lever Module Control Module
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Electronic Selector Lever Module Control Module, Location

The electronic selector lever module control module (n15/5) is located in the center console of the vehicle. See **Fig. 98**.

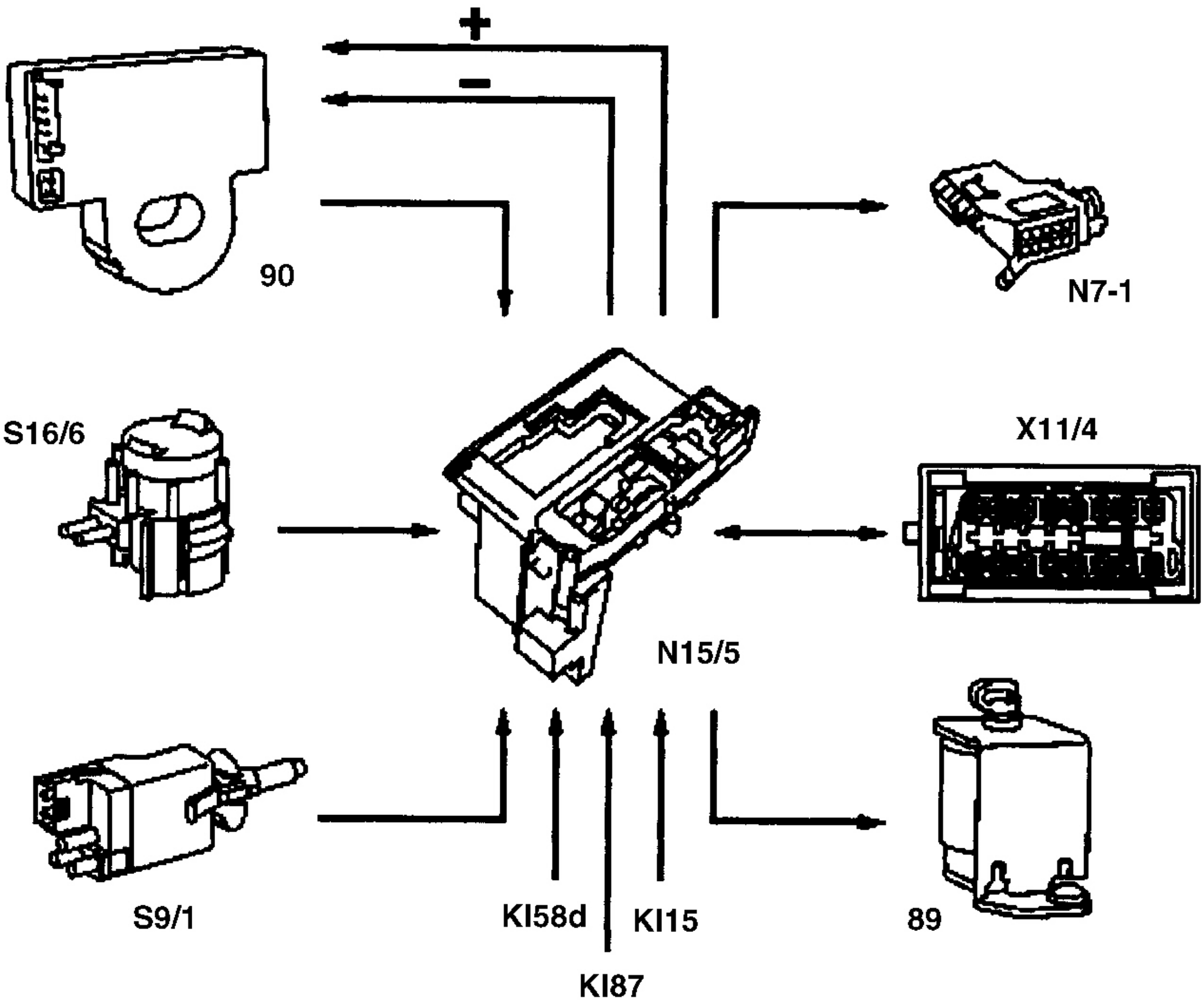
Electronic Selector Lever Module Control Module, Task

See **ELECTRONIC SELECTOR LEVER MODULE CONTROL MODULE, TASK**.

Electronic Selector Lever Module Control Module, Design

See **ELECTRONIC SELECTOR LEVER MODULE CONTROL MODULE, DESIGN**.

Electronic Selector Lever Module ESM Control Module, Task

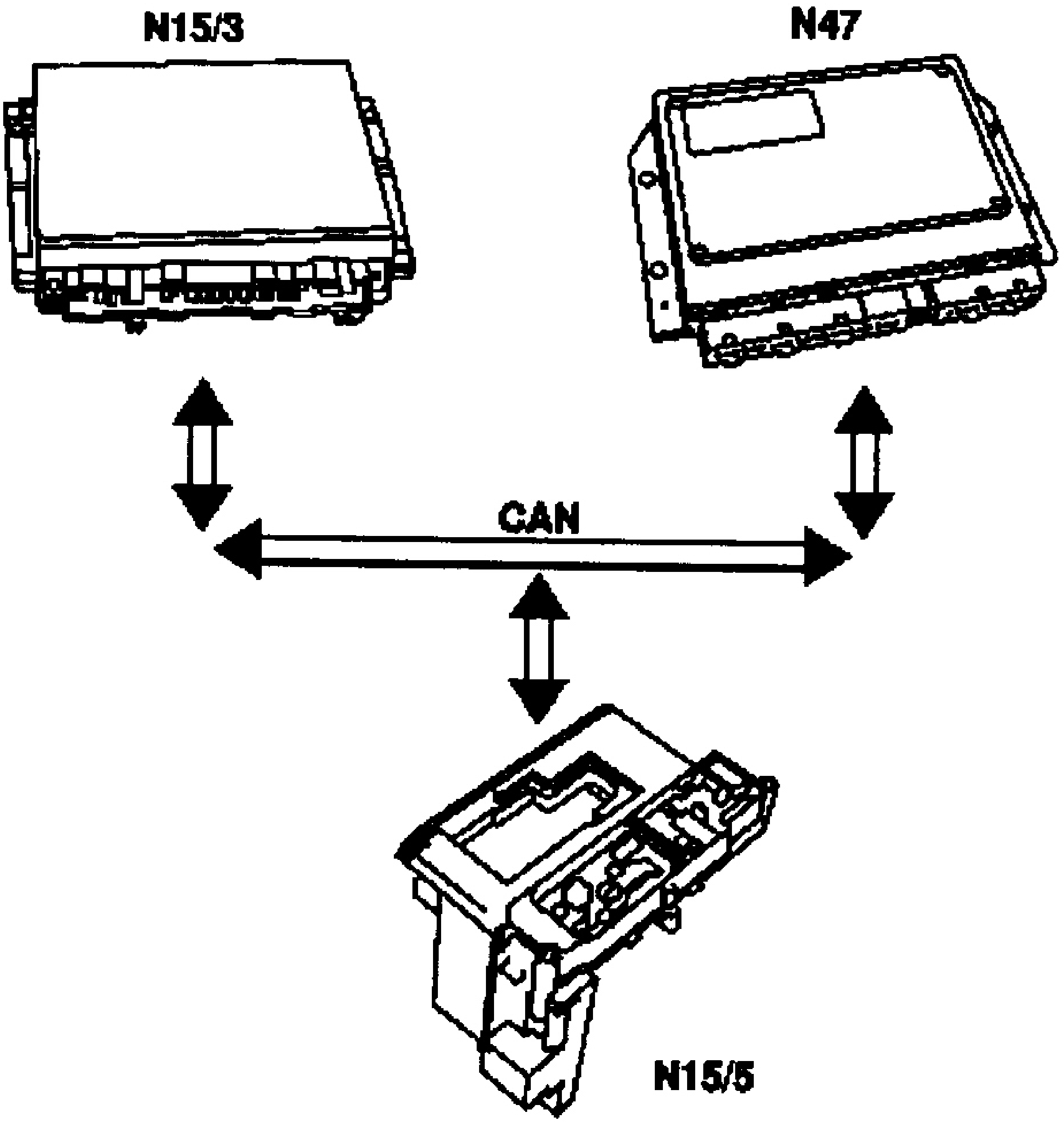


Input and output signals

89	R/P locking solenoid	N15/5	Electronic selector lever control module
90	Potentiometer	0S9/1	Stop lamp switch
Kl58d	Signal for illuminating shift gate	S16/6	Kickdown switch
Kl87	Voltage supply	X11/4	Data link connector
N7-1	Light module		

G00391213

Fig. 99: Input & Output Signals
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



CAN data bus

CAN	Engine compartment bus	N15/5	Electronic selector lever control module
N15/3	ETC control module		

Fig. 100: CAN Data Bus
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Task

The electronic selector lever module control module (N15/5) receives digital and analog input signals, converts these signals and controls various components or transfers information to various control modules via CAN.

In selector lever position "D" lateral touch movements in the "+" or "-" direction are detected by the electronic selector lever module control module (N15/5) via two contacts and are conveyed to the ETC control module (N15/3) via the engine compartment bus. See **Fig. 99** and **Fig. 100** .

The selector lever positions are determined by the slider position of the potentiometer and transferred to the electronic selector lever module control module 90 (N15/5).

The selection diagram symbols (shift pattern display) are illuminated by means of LEDs when low beam is switched on.

Input signals:

- Selector Lever Position (From Potentiometer (90))
- Touch Button +/-
- Voltage Supply (Terminal 87)
- Power Supply For Reverse Lamp (Terminal 15)
- Signal For Shift Gate Illumination (Terminal 58D)
- Kickdown Switch (S16/6)
- Stop Light Switch (S9/1)

Input & Output Signals:

- Datalink connector (X11/4)

Output Signals:

- R/P locking solenoid (89)
- Power supply and ground for potentiometer
- Reverse lamp (via the light module (N7-1)).

Via The Engine Compartment Bus, There Are Connections To The:

ETC (EGS) Control Module (N15/3)
Traction System Control Module (N47)

The Following Information Is Received:

Traction system control module (N47)

- Rear Right Wheel Speed
- Rear Left Wheel Speed

The following information is sent:

ETC (EGS) control module (N15/3)

- Selector lever position
- Kickdown switch (S16/6)
- Touch button +/-

Electronic Selector Lever Module Control Module, Design

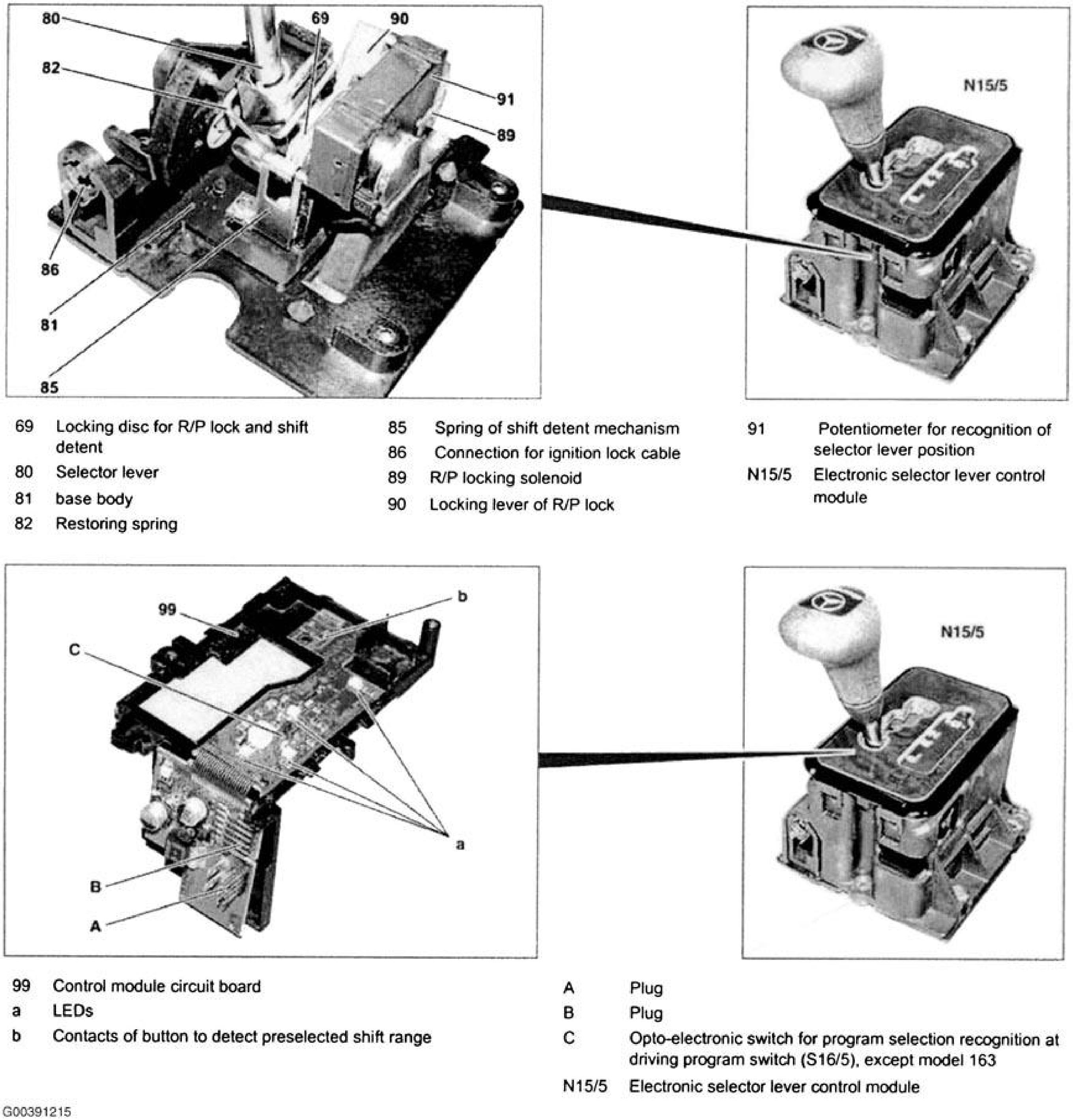


Fig. 101: Electronic Selector Lever Module Control Module, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Temperature Sensor, Location/Task/Design/Function

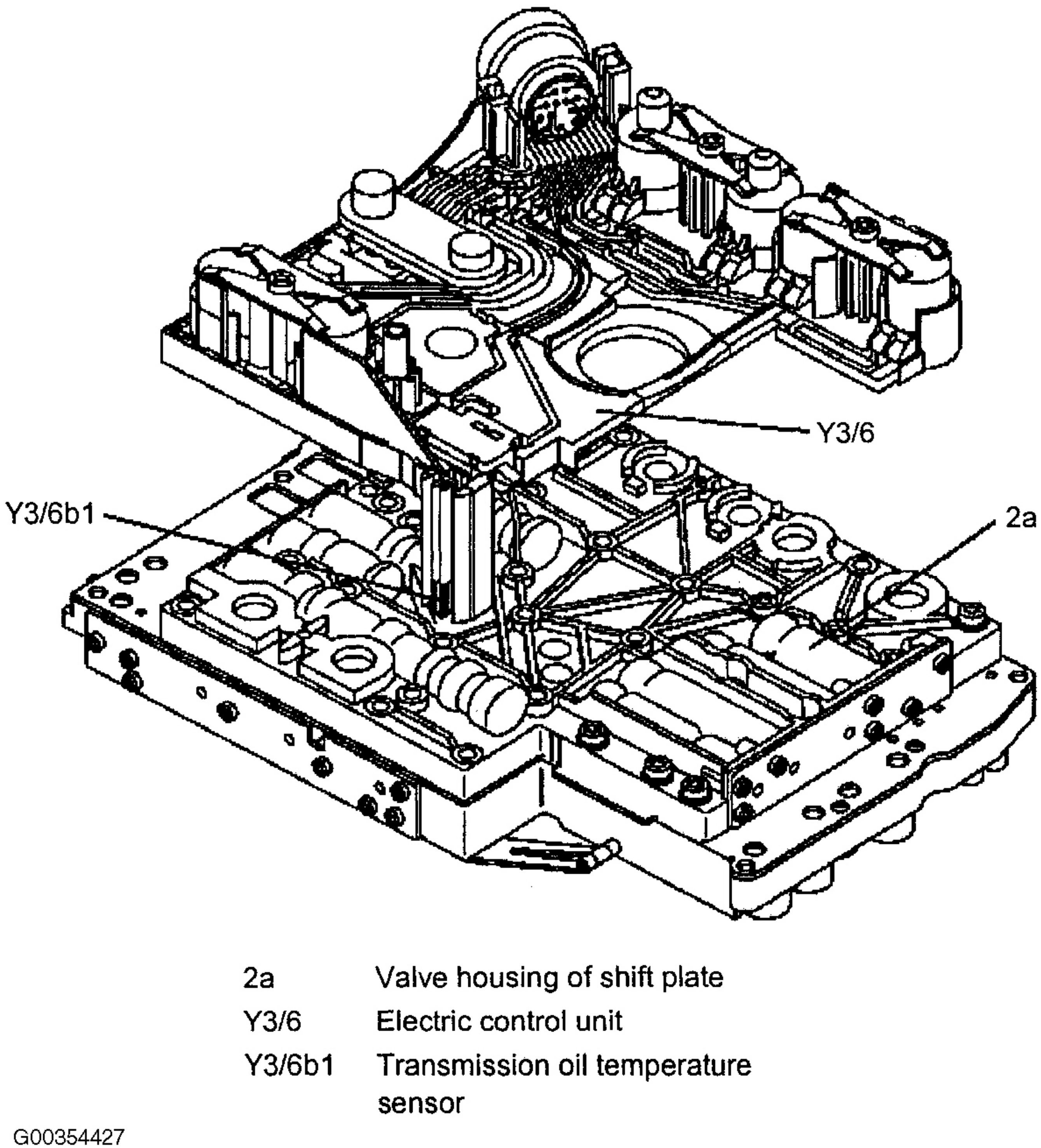


Fig. 102: Temperature Sensor, Location/Task/Design/Function

Temperature Sensor, Location

The transmission oil temperature sensor (Y3/6bl) is located in the electrical control unit (Y3/6) and is permanently connected to the conductor tracks. See **Fig. 102**.

Temperature Sensor, Task

To measure the temperature of the transmission oil and pass the temperature to the ETC control unit (N15/3) as an input signal.

Temperature Sensor, Design

Temperature-dependent resistor (PTC).

Temperature Sensor, Function

See **TEMPERATURE SENSOR, FUNCTION**.

Temperature Sensor, Function

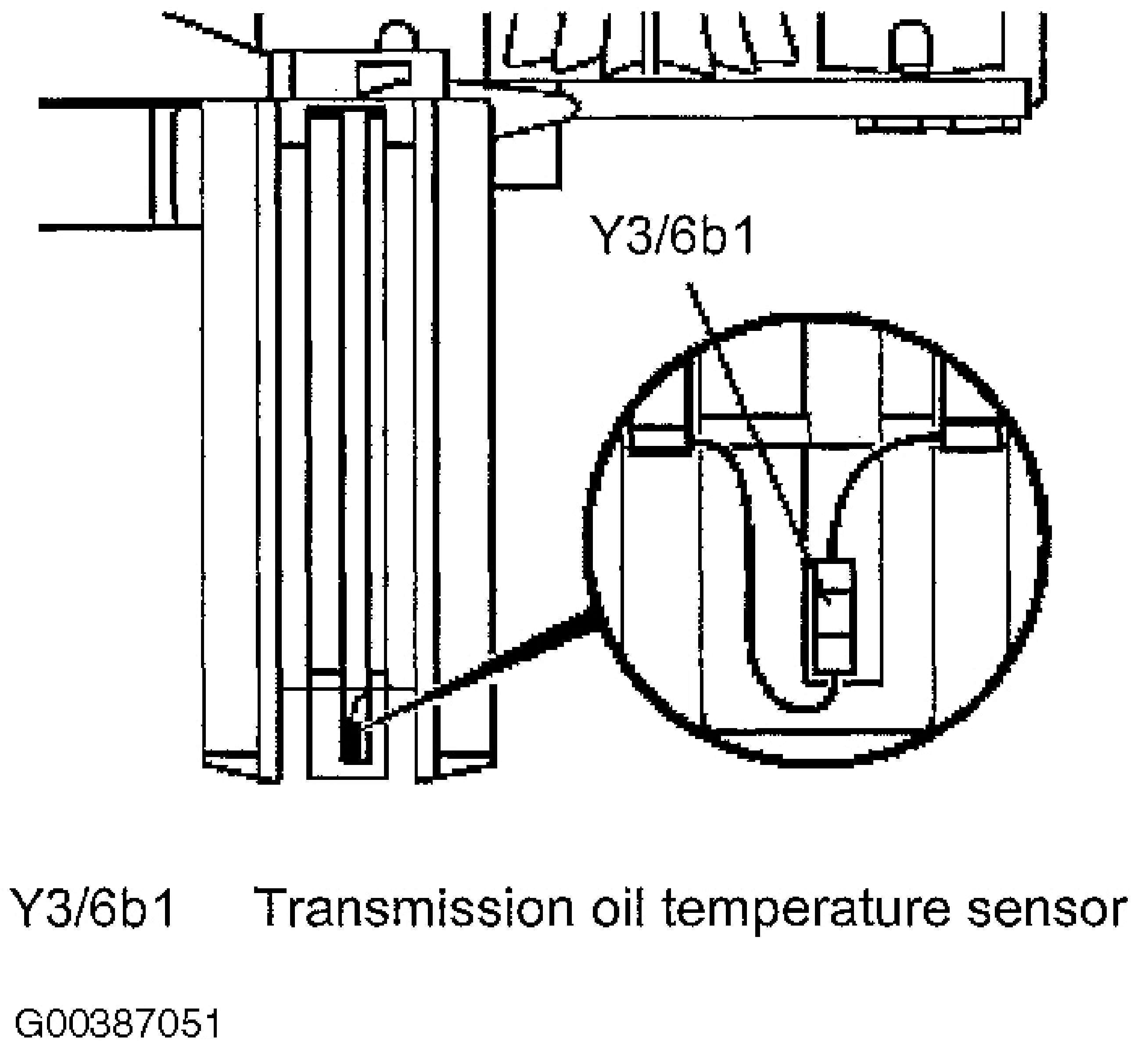


Fig. 103: Temperature Sensor, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The temperature of the transmission oil has a major influence on the shift time and thus on the shift quality. It is possible to optimize the gear shifts in all temperature ranges by detecting the oil temperature. See **Fig. 103**.

The transmission oil temperature sensor (Y3/6b1) is connected in series with the starter lockout contact (Y3/6s1). The temperature signal is transmitted to the ETC control module (N15/3) only the dry-reed contact of the starter lockout contact (Y3/6s1) is closed.

Selector Valve, Location/Task

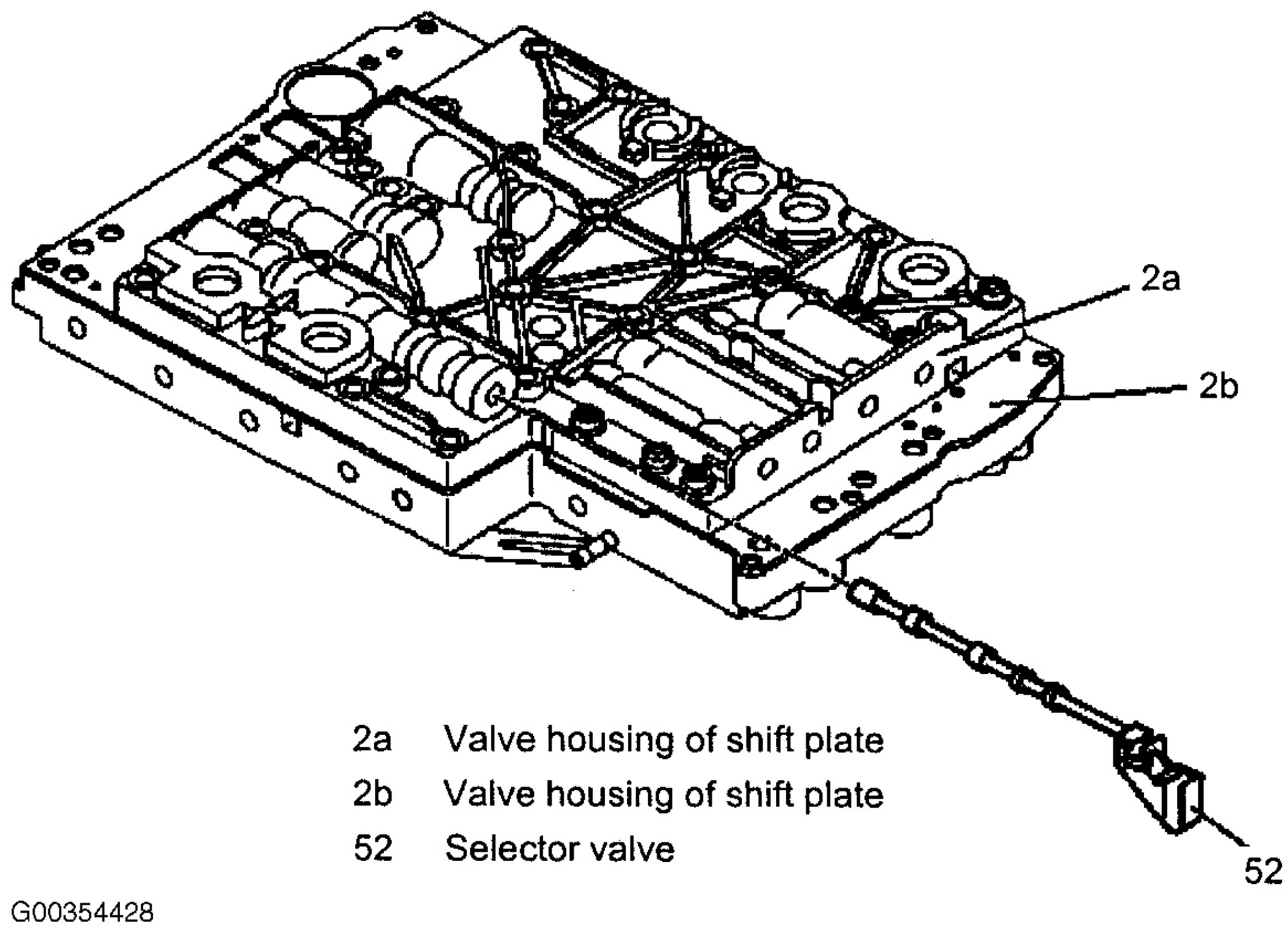


Fig. 104: Selector Valve, Location/Task
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Selector Valve, Location

The selector valve (52) is located in the valve housing of the shift plate (2a). See **Fig. 104**.

Selector Valve, Task

Distributes pressure to the appropriate hydraulic components according to the selector lever position

selected by the driver.

Torque Converter Lock-Up Clutch, Location/Task/Design/Function

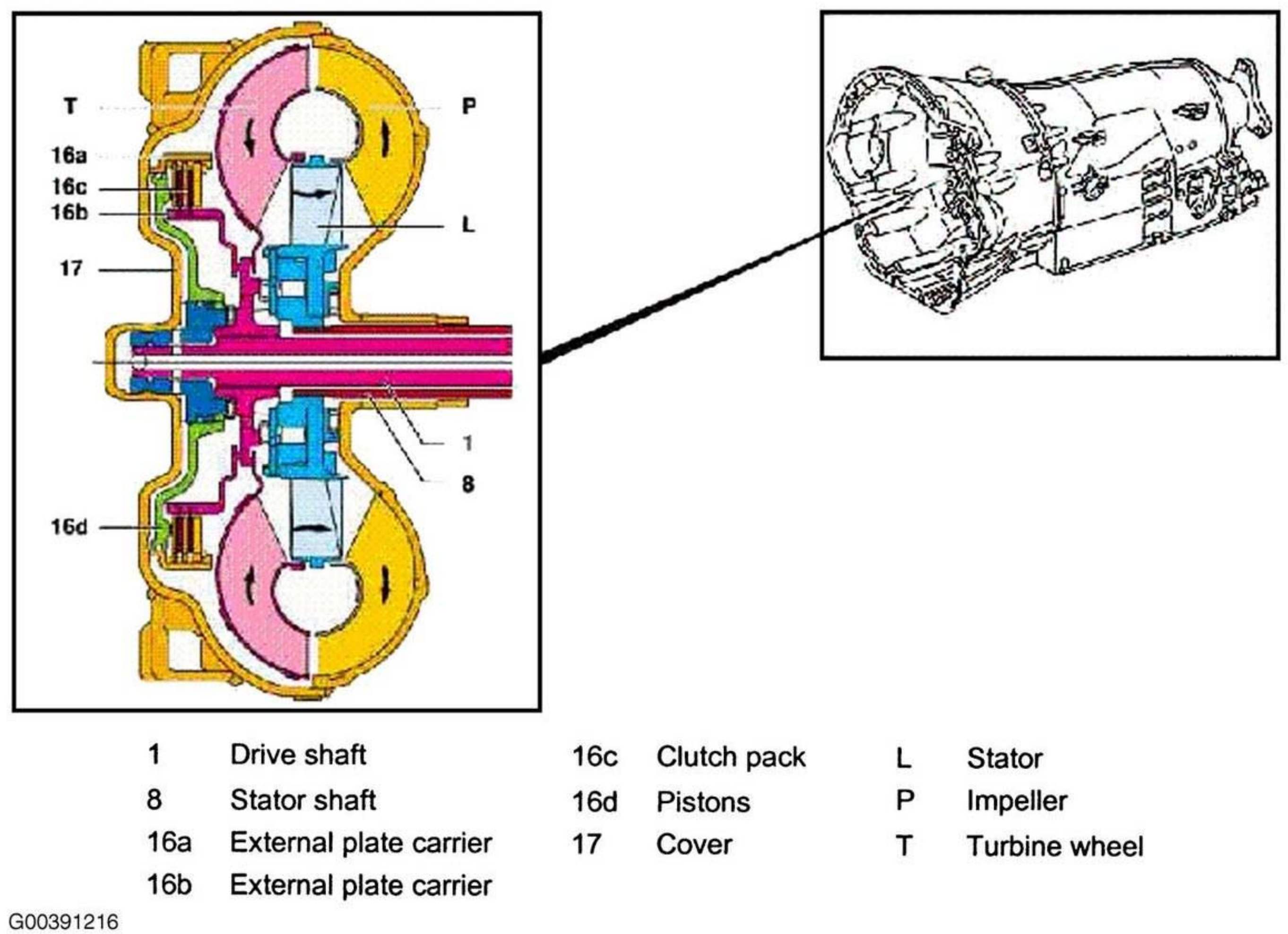


Fig. 105: Torque Converter Lockup Clutch, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Torque Converter Lockup Clutch, Location

The torque converter lockup clutch is integrated in the torque converter. See **Fig. 105**.

Torque Converter Lockup Clutch, Task

The torque converter lockup clutch minimizes the power losses of the torque converter and as a result reduces the engine speed and improves the efficiency of the transmission.

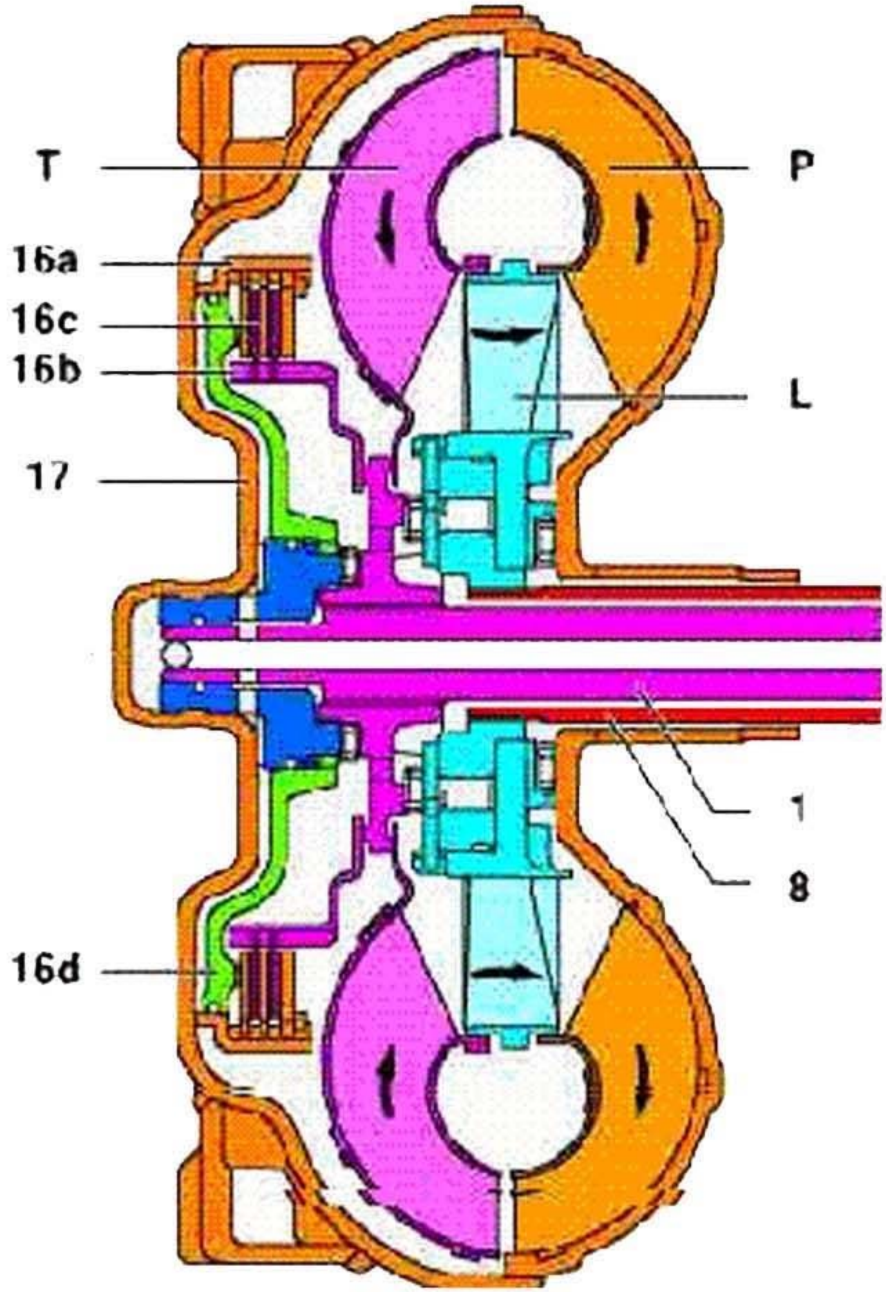
Torque Converter Lockup Clutch, Design

The external plate carrier (16a) is connected to the impeller (P) via the cover shell (17). The internal plate carrier (16b) is connected to the turbine wheel (T).

Torque Converter Lockup Clutch, Function

See **Torque Converter Lockup Clutch, Function**. See **TORQUE CONVERTER LOCKUP CLUTCH, FUNCTION**.

Torque Converter Lockup Clutch, Function



1 Drive shaft
8 Stator shaft
16a Externally toothed disk carrier
16b Internally toothed

16c Clutch pack
16d Piston
17 Cover
L Stator
P Impeller

Fig. 106: Torque Converter Lockup Clutch, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

When actuated by the ETC control module (N15/3), oil pressure controlled by the torque converter lockup PWM solenoid Valve (Y3/6y6) is directed through the input shaft (1) to the pressure chamber behind the piston (16d). See **Fig. 106**. The piston presses the clutch pack (16c) together and allows torque to be transferred directly between the impeller (P) and turbine wheel (T). The torque converter lockup clutch is activated in 5th, 4th and 3rd gears in relation to the engine speed and engine load.

AUTOMATIC TRANSMISSION, FUNCTION

Transmission without touch shift. 722.6 in MODEL 163, 170, 202, 208, 210.

Transmission 722.6 in MODEL 129, 140.

Automatic transmission 722.6 is an electronically controlled 5-speed transmission with a lockup clutch in the torque converter.

The ratios for the gear stages are achieved by three planetary gear sets. The 5th gear is designed with a step-up ratio as an overdrive.

Shifting is initiated electronically. The gears are shifted by the corresponding combination of three hydraulically actuated multi-plate brakes, three hydraulically actuated multi-disc clutches and two mechanical freewheels.

Basically automatic transmission 722.6 with electronic control offers the following advantages:

- Reduced fuel consumption
- Improved shift comfort
- More favorable gear steps as a result of 5 gears
- Enhanced life and reliability
- Reduced servicing costs

The electrohydraulic control unit is bolted onto the bottom of the transmission housing. The end of the transmission is formed by an oil pan made of sheet steel.

The oil pressure for the converter lockup clutch and center multiple disc clutch is supplied via holes in the input shaft. The oil pressure to the rear multiple-disc clutch is routed through the output shaft. The lubricating oil is supplied and distributed by additional bore holes in both shafts. All bearing points of the gear sets as well as freewheels and shift elements are supplied with lubricating oil.

The parking lock gear and drive flange are connected to the output shaft by gearing.

Freewheels F1 and F2 optimize shifting. The front freewheel (F1) rests against the stator shaft extension on the

transmission side and connects the sun gear of the front planetary gear set to the transmission housing in the locking direction.

The torque converter housing and transmission housing are made of a metal alloy. They are bolted together and centered via the outer multiple-disc carrier of the multiple-disc brake B1. A coated intermediate panel seals the two components.

The oil pump and outer multiple-disc carrier of the front multiple-disc brake are bolted to the converter housing.

The mechanical part consists of the propeller shaft, output shaft, a sun gear shaft and three planetary gearsets which are coupled together.

In transmissions for powerful engines, the planetary gearsets have 4 planetary gears, while for less powerful engines the front and rear planetary gear system has three planetary gear wheels. The stator shaft is pressed into this and is secured against turning by a spline.

The rear freewheel (F2) connects the sun gear of the center planetary gear set to the sun gear of the rear planetary gearset in the locking direction.

The electrohydraulic control unit consists of the shift plate made of light alloy for hydraulic control and an electronic control unit.

The electrical control unit consists of a supporting body made of plastic in which the electrical components are combined. The shell is screwed to the shift plate. Conductor tracks which are integrated into the shell, connect the electric components to a plug connector. This 13-pin plug connector forms the connection with the vehicle-side wiring harness and with the ETC 5 (electronic transmission control) control module (N15/5) via a bayonet lock.

Automatic Transmission, Location Of Mechanical Components

See **AUTOMATIC TRANSMISSION, LOCATION OF MECHANICAL PARTS**.

Automatic Transmission, Location Of Electrical/Electronic Components

See **AUTOMATIC TRANSMISSION, LOCATION OF ELECTRIC/ELECTRONIC COMPONENTS**.

Automatic Transmission, Location Of Hydraulic Components

See **AUTOMATIC TRANSMISSION, POSITION OF HYDRAULIC COMPONENTS**.

Automatic Transmission, Location of Components, Floor Shift

See **AUTOMATIC TRANSMISSION, LOCATION OF COMPONENTS, FLOOR SHIFT**.

Automatic Transmission, Selector Lever Positions

See **AUTOMATIC TRANSMISSION, SELECTOR LEVER POSITIONS**.

Automatic Transmission, Gear Ratios

See **AUTOMATIC TRANSMISSION, GEAR RATIOS**.

Power Transmission, Function

See **POWER TRANSMISSION, FUNCTION**.

Gearshift System, Function

See **FUNCTION OF GEAR SHIFT**.

Hydropneumatic Transmission Control, Function

See **HYDROPNEUMATIC TRANSMISSION CONTROL, FUNCTION**.

Shift-Lock, Function

See **SHIFT-LOCK FUNCTION**.

Automatic Transmission, Location of Components, Floor Shift (Without Touch Shift)

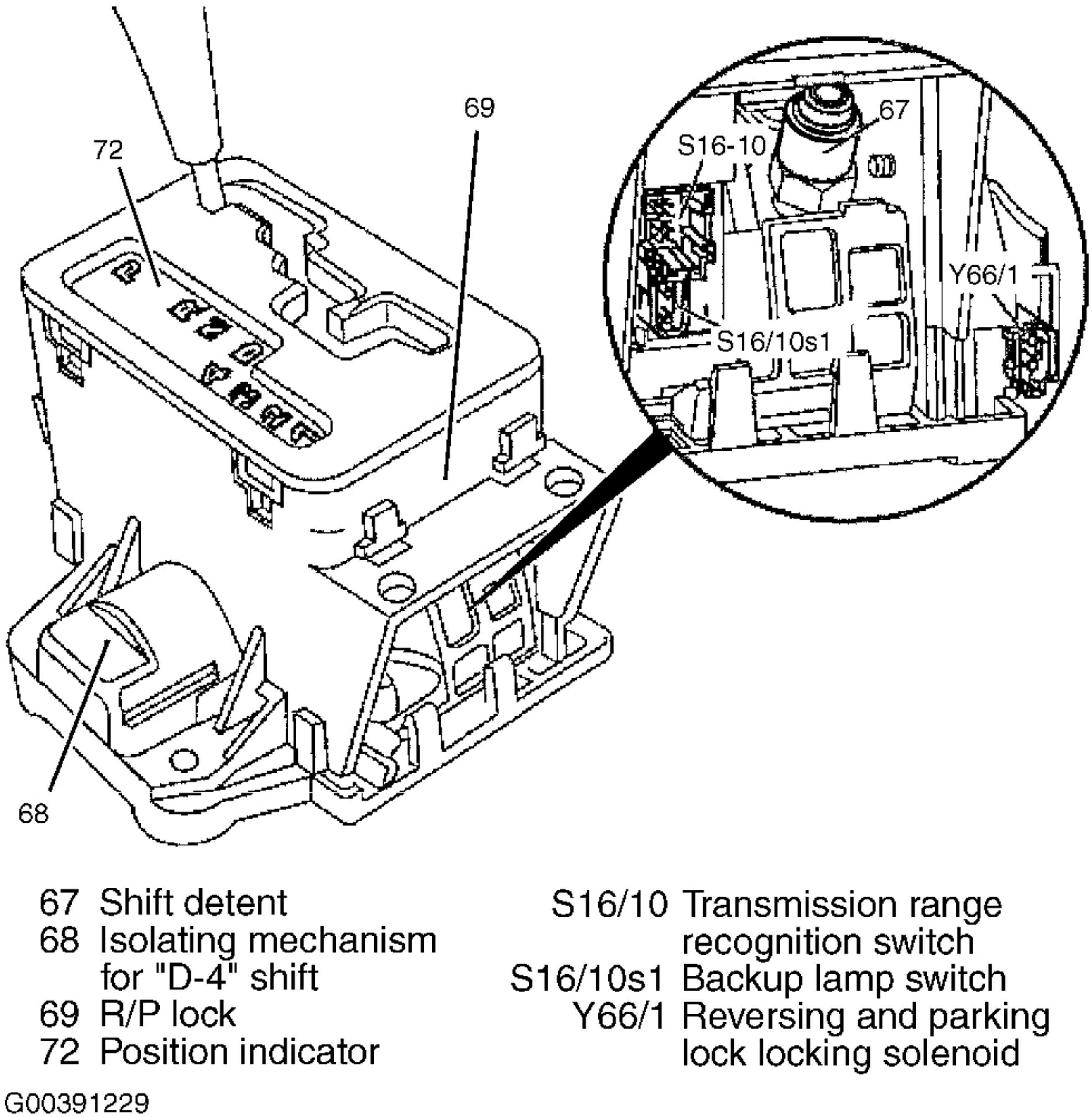
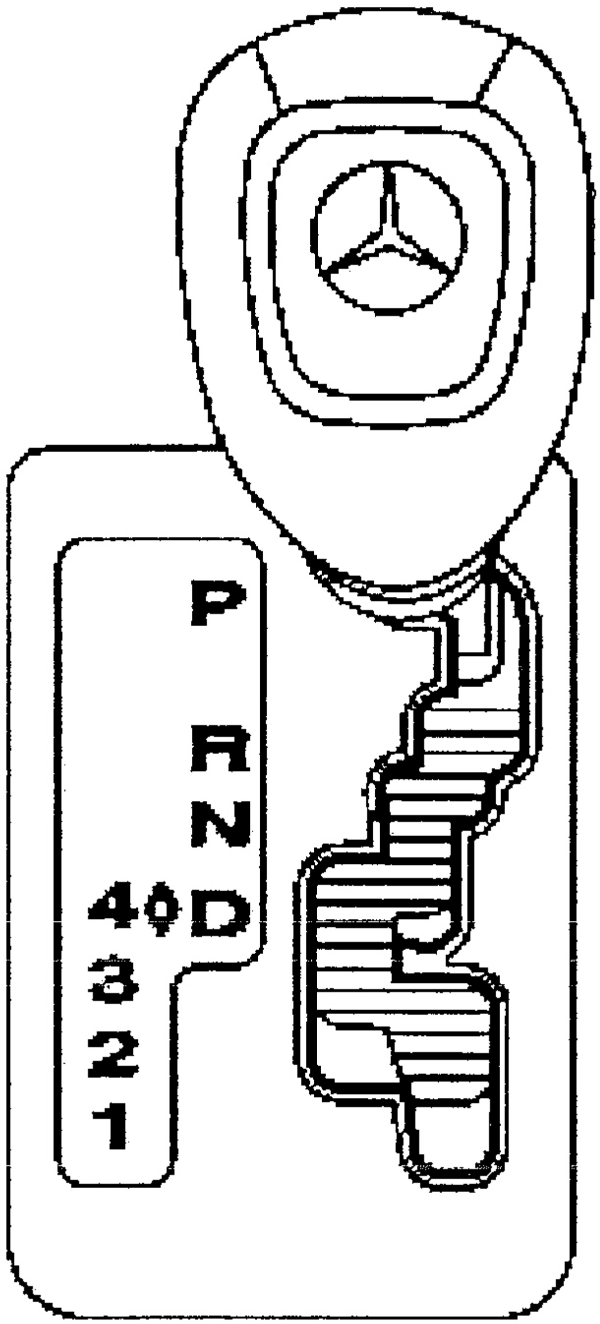


Fig. 107: Automatic Transmission, Location Of Component, Floor Shift (Without Touch Shift)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Automatic Transmission, Selector Lever Positions (Without Touch Shift)

The selector lever can be moved into eight different positions. Transverse shift in positions "D" and "4". See **Fig. 108**.



The selector lever can be moved into eight different positions.
Transverse shift in positions "D" and "4".

The selector lever positions have the following meanings:

P Park pawl and starting position

R Reverse gear

D All five forward gears are available.

4 Upshifting only up to 4th gear

Fig. 108: Selector Lever Positions
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

AUTOMATIC TRANSMISSION, FUNCTION

Transmission With Touch Shift 722.6 In Model 163

Transmission 722.6 is an electronically controlled 5-speed transmission with a lockup clutch in the torque converter.

The ratios for the gear stages are achieved by 3 planetary gearsets. The 5th gear is designed as a low-rev gear with an overdrive ratio.

Shifting is initiated electronically. The gears are shifted by the corresponding combination of 3 hydraulically actuated multi-disk brakes, 3 hydraulically actuated multi-disk clutches and 2 mechanical freewheels.

The oil pump as well as the external plate carrier of the front multi-disk brake are bolted to the torque converter housing.

The mechanical part of the transmission 722.6 consists of a drive shaft, output shaft, a sun gear shaft and 3 planetary sets which are coupled to each other.

The electrohydraulic control unit is screwed onto the transmission housing from below. The end of the transmission if formed by an oil pan made of sheet steel.

The oil pressure of the torque converter lockup clutch and center multi-disk clutch is supplied via bore holes in the drive shaft. The oil pressure to the rear multi-disk clutch is supplied via the output shaft. The lubricating oil is supplied and distributed by additional bore holes in both shafts. Oil is supplied to all bearing points of the gearsets as well as to the freewheels and shifting elements.

The parking lock gear and drive flange are connected to the output shaft by gearing.

Basically transmission 722.6 with electronic control offers the following advantages:

- Reduced fuel consumption.
- Greater ease of shifting.
- Favorable spacing by 5 gears.
- Long service life and high reliability.
- Low maintenance costs.

The torque converter housing and transmission housing consist of a light-metal alloy. Both housings are bolted together and are centered via the external plate carrier of the multi-disk brake at the front. A coated intermediate panel seals the two components.

Freewheels F1 and F2 optimize shifting. The front freewheel F1 is supported on the extension of the stator shaft on the transmission end and connects in the locking direction the sun gear of the front planetary gearset with the

transmission housing.

The rear freewheel F2 connects in the locking direction the sun gear of the center planetary set with the sun gear of the rear planetary set. The electrohydraulic control unit is comprised of a light alloy shift plate for the hydraulic control and an electric control unit.

The electronic control unit consists of a plastic shell which combines all the electric components. The shell is mounted on and bolted to the shift plate. Conductor tracks which are laid in the supporting body make the connection between the electrical components and a 13-pin plug socket.

Automatic Transmission, Location Of Mechanical Components

See **AUTOMATIC TRANSMISSION, LOCATION OF MECHANICAL PARTS**.

Automatic Transmission, Location Of Electrical/Electronic Components

See **AUTOMATIC TRANSMISSION, LOCATION OF ELECTRIC/ELECTRONIC COMPONENTS**.

Automatic Transmission, Location Of Hydraulic Components

See **AUTOMATIC TRANSMISSION, POSITION OF HYDRAULIC COMPONENTS**.

Automatic Transmission, Location Of Floor Shift Components.

See **AUTOMATIC TRANSMISSION, LOCATION OF FLOOR SHIFT COMPONENTS**.

Automatic Transmission, Selector Lever Positions

See **AUTOMATIC TRANSMISSION, SELECTOR LEVER POSITIONS**.

Automatic Transmission, Driver Information

See **AUTOMATIC TRANSMISSION, DRIVER INFORMATION**.

Automatic Transmission, Gear Ratios

See **AUTOMATIC TRANSMISSION, GEAR RATIOS**.

Power Transmission, Function

See **AUTOMATIC TRANSMISSION, POWER TRANSMISSION, FUNCTION**.

Gearshift System, Function

Models 163, 170, 202, 208, 210, 215, 220, 240 (except 215.374/379, 220.074/174/179). See **FUNCTION OF GEAR SHIFT**.

Function Of Transmission Control

See **HYDROPNEUMATIC TRANSMISSION CONTROL, FUNCTION**.

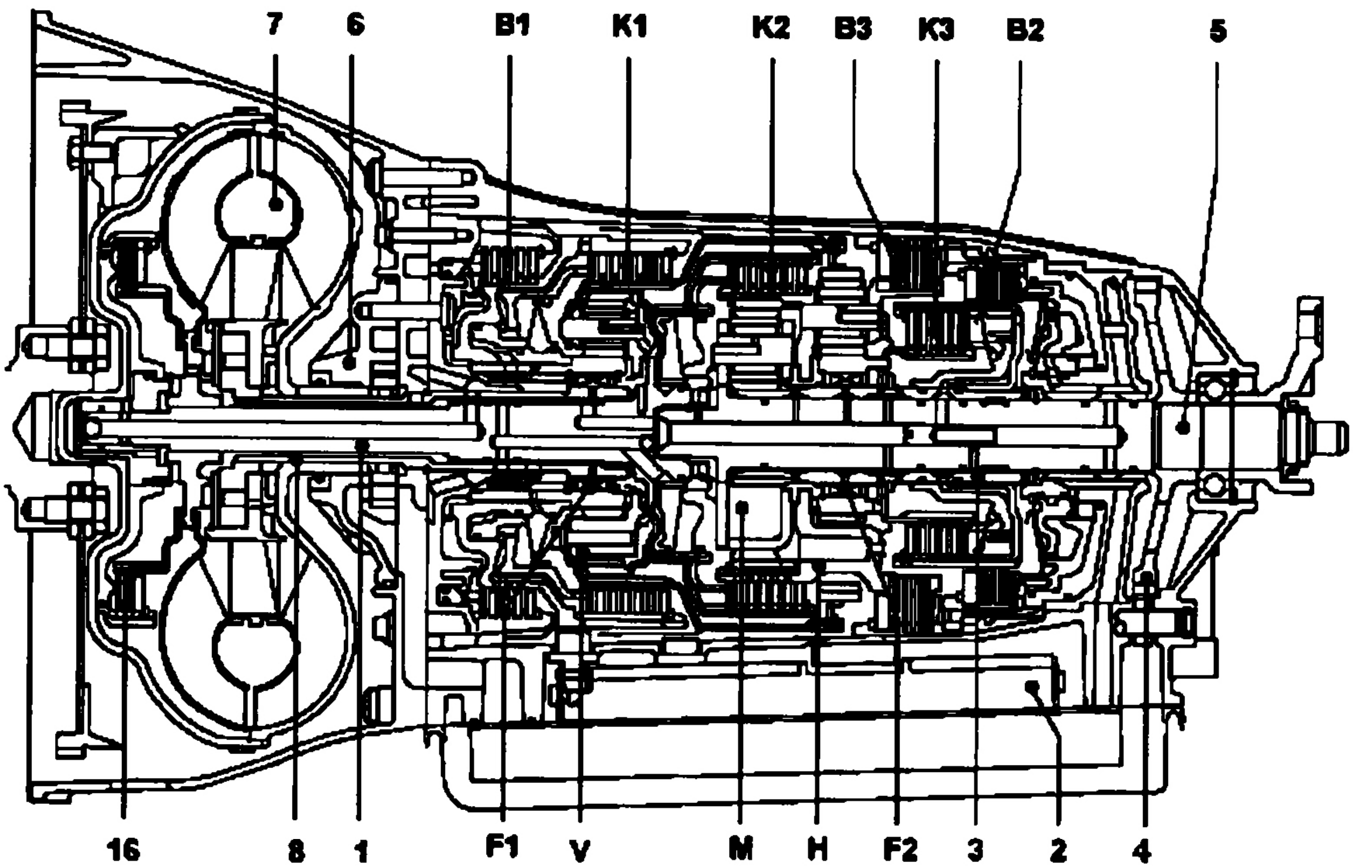
Kick-Down, Function

Model 163, 170, 202, 208, 210. Model 215, 220 up to 31.05.02. See **KICK-DOWN FUNCTION (UP TO 5/31/02)**.

Shift-Lock, Function

Model 163, 170, 202, 208, 210. See **SHIFT-LOCK FUNCTION**.

Automatic Transmission, Location Of Mechanical Parts



1 Drive shaft
2 Electrohydraulic control unit
3 Intermediate shaft
4 Parking lock gear
5 Output shaft
6 Oil pump
7 Torque converter
8 Stator shaft
16 Torque converter lockup clutch
B1 Front multiple-disc brake
B2 Rear multiple-disc brake
B3 Center multiple-disc brake
F1 Front freewheel
F2 Rear freewheel
H Rear planetary gear set
K1 Front multiple-disc clutch
K2 Center multiple-disc clutch
K3 Rear multiple-disc clutch
M Middle planetary gearset
V Front planetary gearset

G00354340

Fig. 109: Automatic Transmission, Location Of Mechanical Parts
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Automatic Transmission, Location Of Electric/Electronic Components

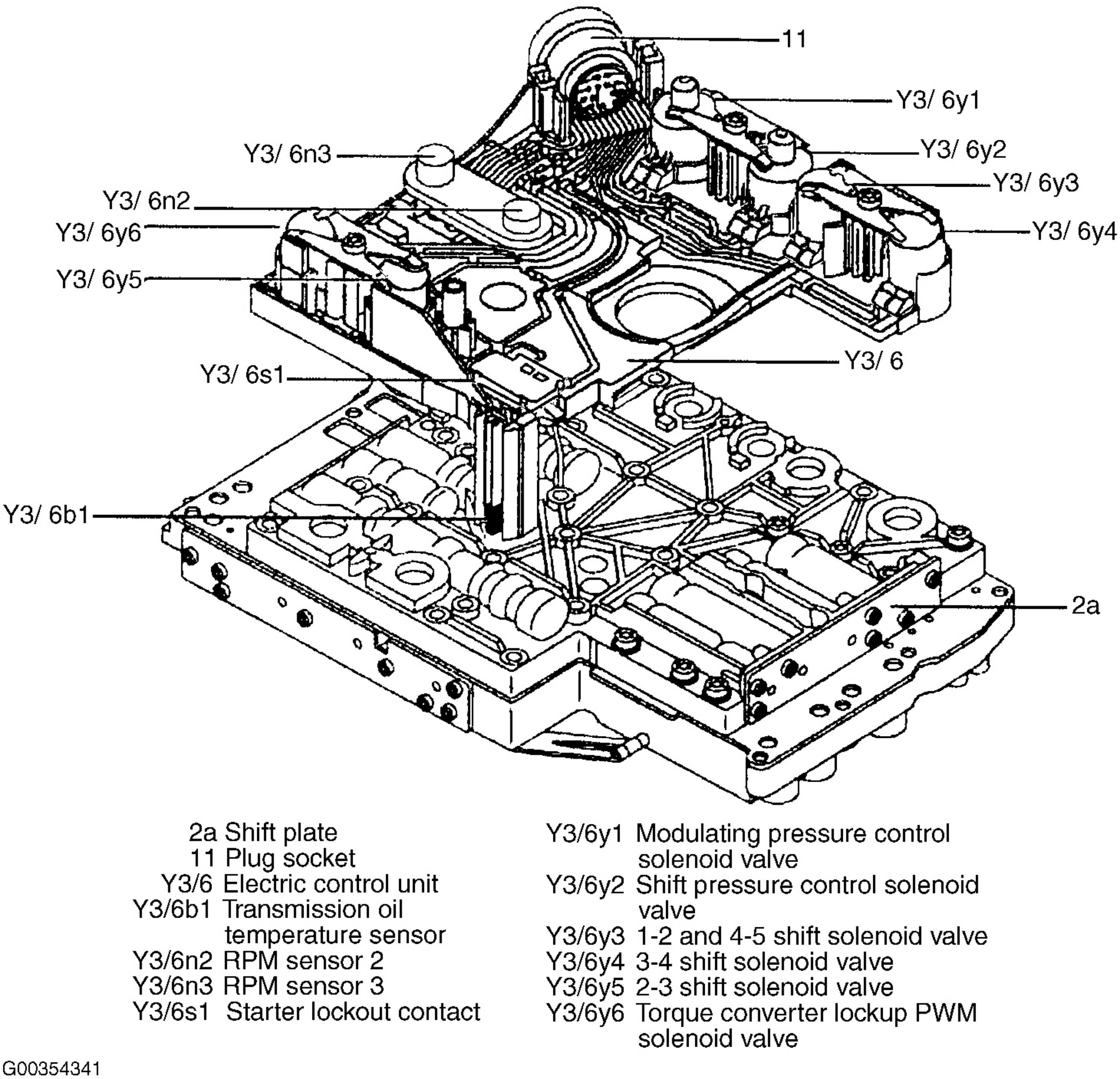


Fig. 110: Automatic Transmission, Location Of Electric/Electronic Components
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Automatic Transmission, Position Of Hydraulic Components

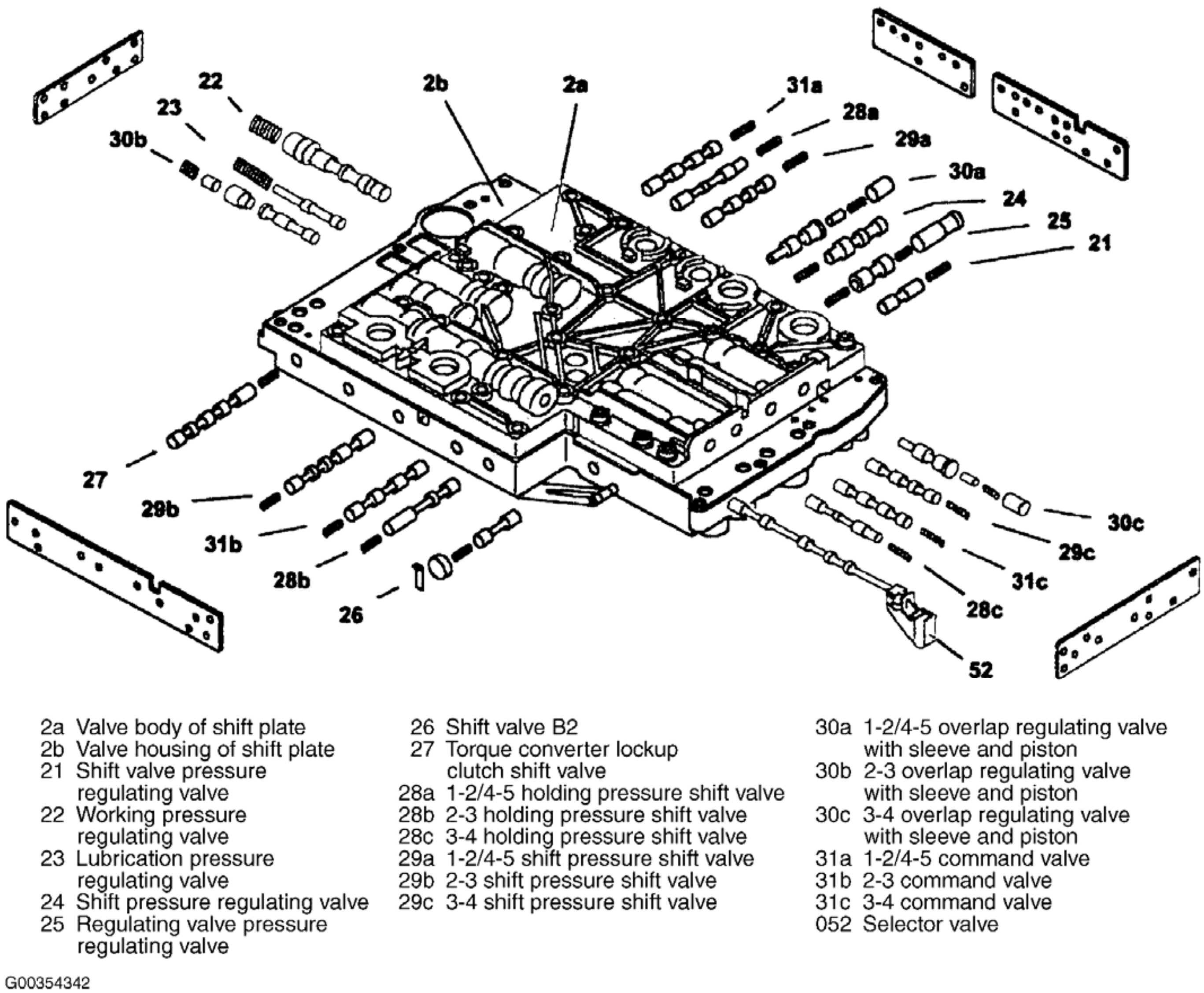


Fig. 111: Automatic Transmission, Position Of Hydraulic Components
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Automatic Transmission, Location Of Floor Shift Components

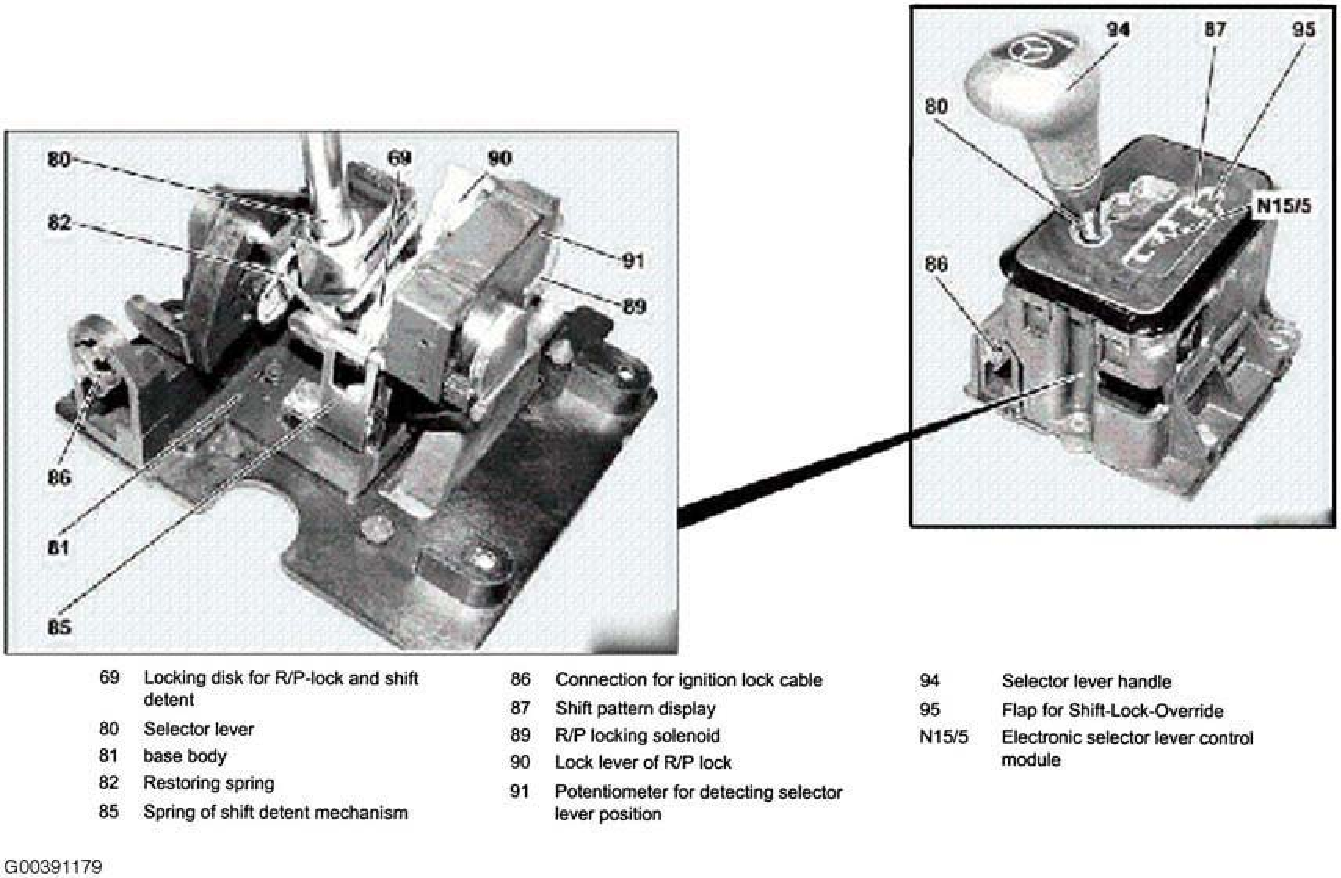


Fig. 112: Automatic Transmission, Location Of Floor Shift Components
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Automatic Transmission, Selector Lever Positions (With Touch Shift)

Transmission 722.6 up to 31.7.01 with touch shift in model 163.

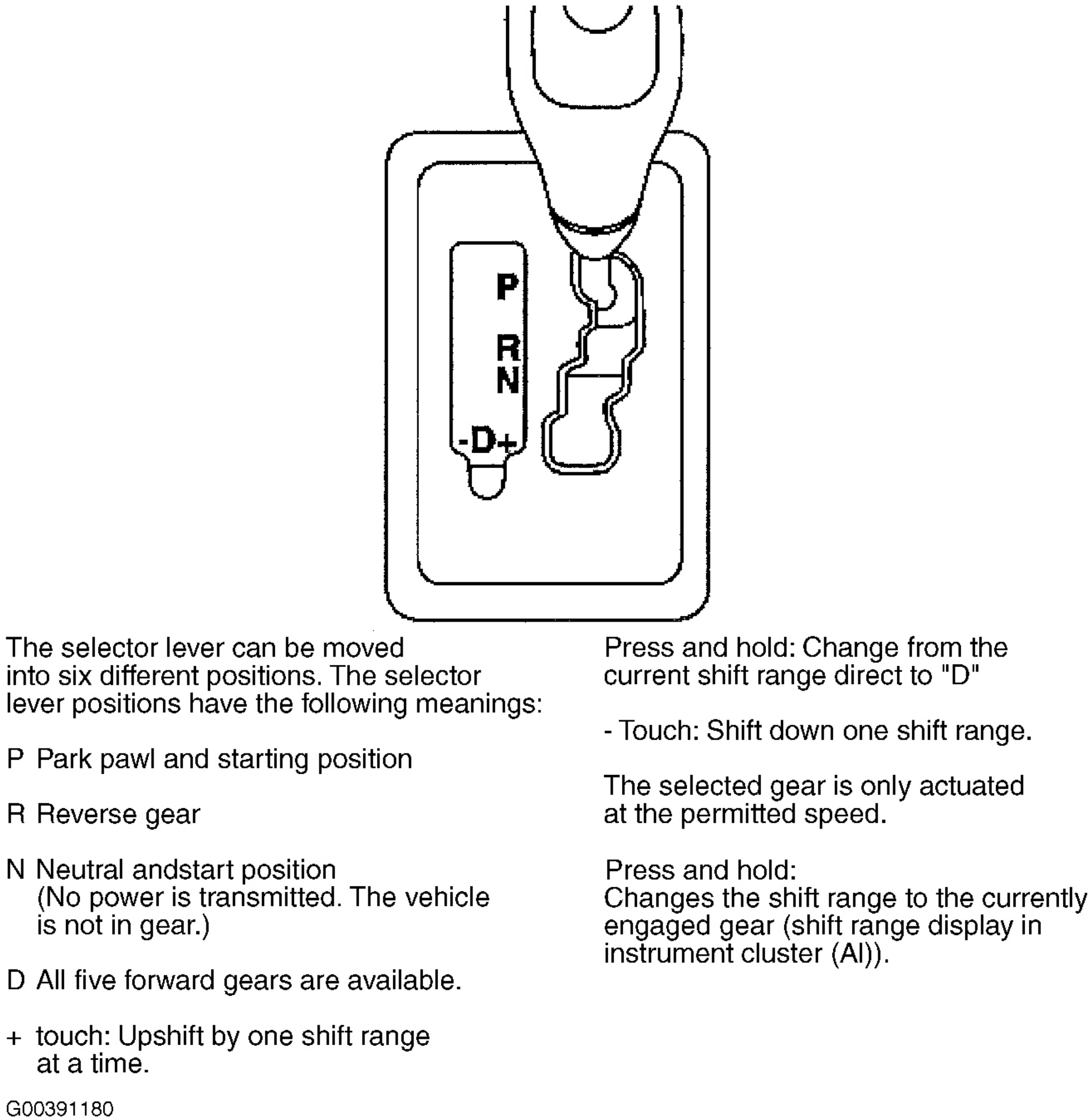


Fig. 113: Automatic Transmission, Selector Lever Positions
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Automatic Transmission, Selector Lever Positions (With Touch Shift)

Transmission 722.6 as of 01.08.01 in model 163

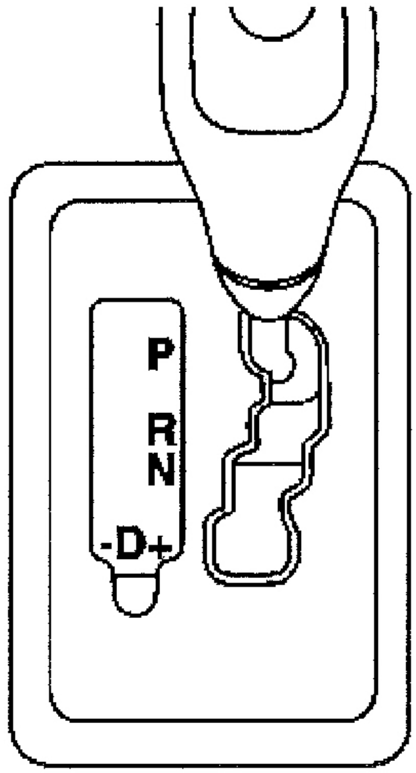
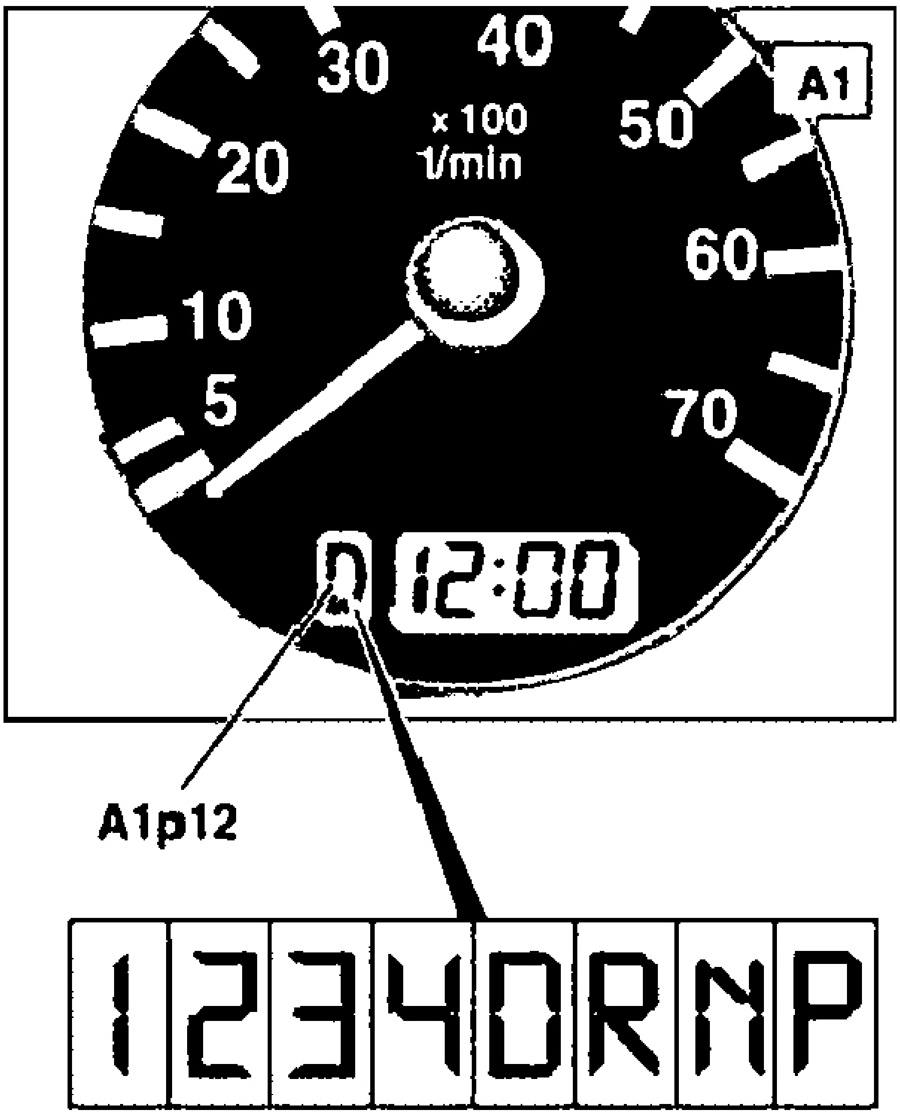


Fig. 114: Automatic Transmission, Selector Lever Positions
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

NOTE: If the shift range is restricted, upshifts occur close to the engine cutoff speed.

Automatic Transmission, Driver Information (With Touch Shift)



Gear display (At pt 2) in instrument cluster (Al):

Shows the drier the currently selected shift range “1”, “2”, “3”, “4” or selector level position “D”, “R”, “N” (neutral) or “P” (park).

A1 instrument cluster

Fig. 115: Automatic Transmission, Driver Information
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Automatic Transmission, Gear Ratios

Gear	Ratio W5A 580	Ratio W5A 330	B1	B2	B3	K1	K2	K3	F1	F2
1	3.59	3.93	□(3)	□				□(3)	□□	
2	2.19	2.41		□		□		□(3)		□
3	1.41	1.49		□		□□				
4	1.0	1.0				□□		□		
5	0.83	0.83	□(3)				□□		□	
N	-	-	□					□		
R (1)	-3.16	-3.10	□(3)		□			□□		
R (2)	-1.93	-1.90			□□			□		

(1) Program "S"

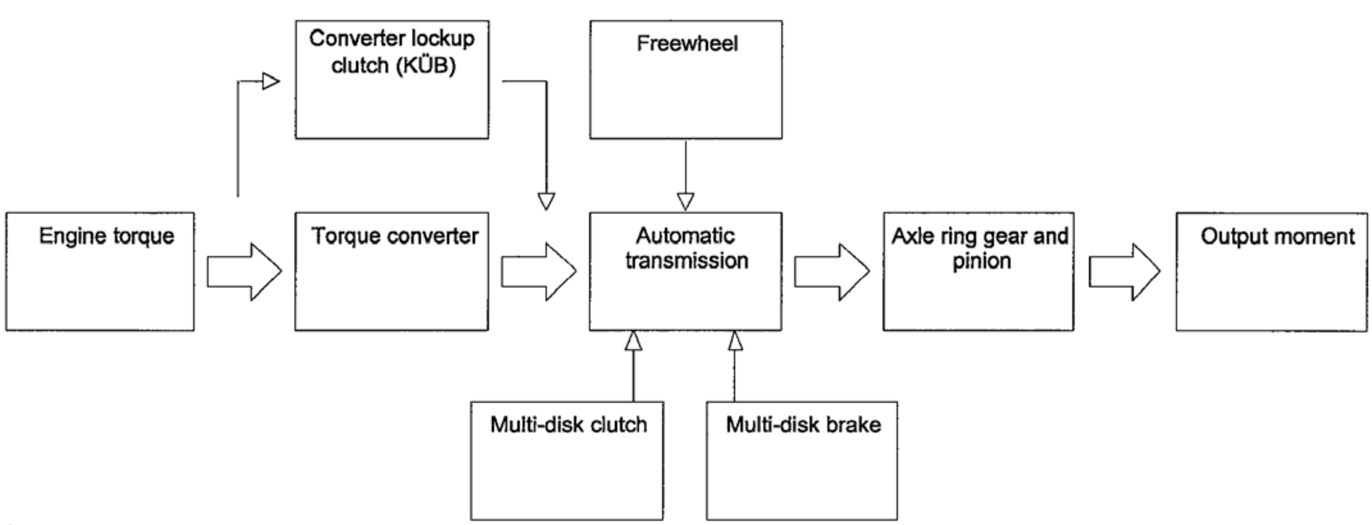
(2) Program "W" or "C" (depending on period of manufacture)

(3) Shift elements are only necessary during deceleration

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Fig. 116: Automatic Transmission, Gear Ratios
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Power Transmission, Function (Without Touch Shift)



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Fig. 117: Automatic Transmission, Power Transmission, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The term power transmission refers to the transmission of propulsion power and engine torques. Via the mechanical/hydraulic connection between the engine, torque converter and the downstream automatic transmission the engine torques are transmitted to the driving wheels and are converted in the transmission via several planetary gear sets.

Power is transferred in the torque converter via the driven impeller by diverting hydraulic fluid to the turbine wheel, which is connected to the input shaft. See **Fig. 117**.

When the torque converter lockup clutch is engaged, power is transmitted via this mechanical connection. Via the gear wheels of the individual planetary gear sets the torques coming from the converter are passed on to the output shaft with the aid of freewheels, multi-disk clutches and brakes, depending on the ratio and shift element operated.

A reduction of the output speed in the low gears provides lower vehicle speeds with high tractive forces and drive torques at the drive wheels.

Power Flow In 1st Gear, Function

See **POWER FLOW IN 1ST GEAR, FUNCTION**.

Power Flow In 2nd Gear, Function

See **POWER FLOW IN 2ND GEAR FUNCTION**.

Power Flow In 3rd Gear, Function

See **POWER FLOW IN 3RD GEAR FUNCTION**.

Power Flow In 4th Gear, Function

See **POWER FLOW IN 4TH GEAR FUNCTION**.

Power Flow In 5th Gear, Function

See **POWER FLOW IN 5TH GEAR FUNCTION**.

Power Flow In Reverse, Function

See **POWER FLOW IN REVERSE, FUNCTION**.

Function Of Torque Converter Lock-Up Clutch Control

See **FUNCTION OF TORQUE CONVERTER LOCKUP CLUTCH CONTROL**.

Power Flow In 1st Gear, Function

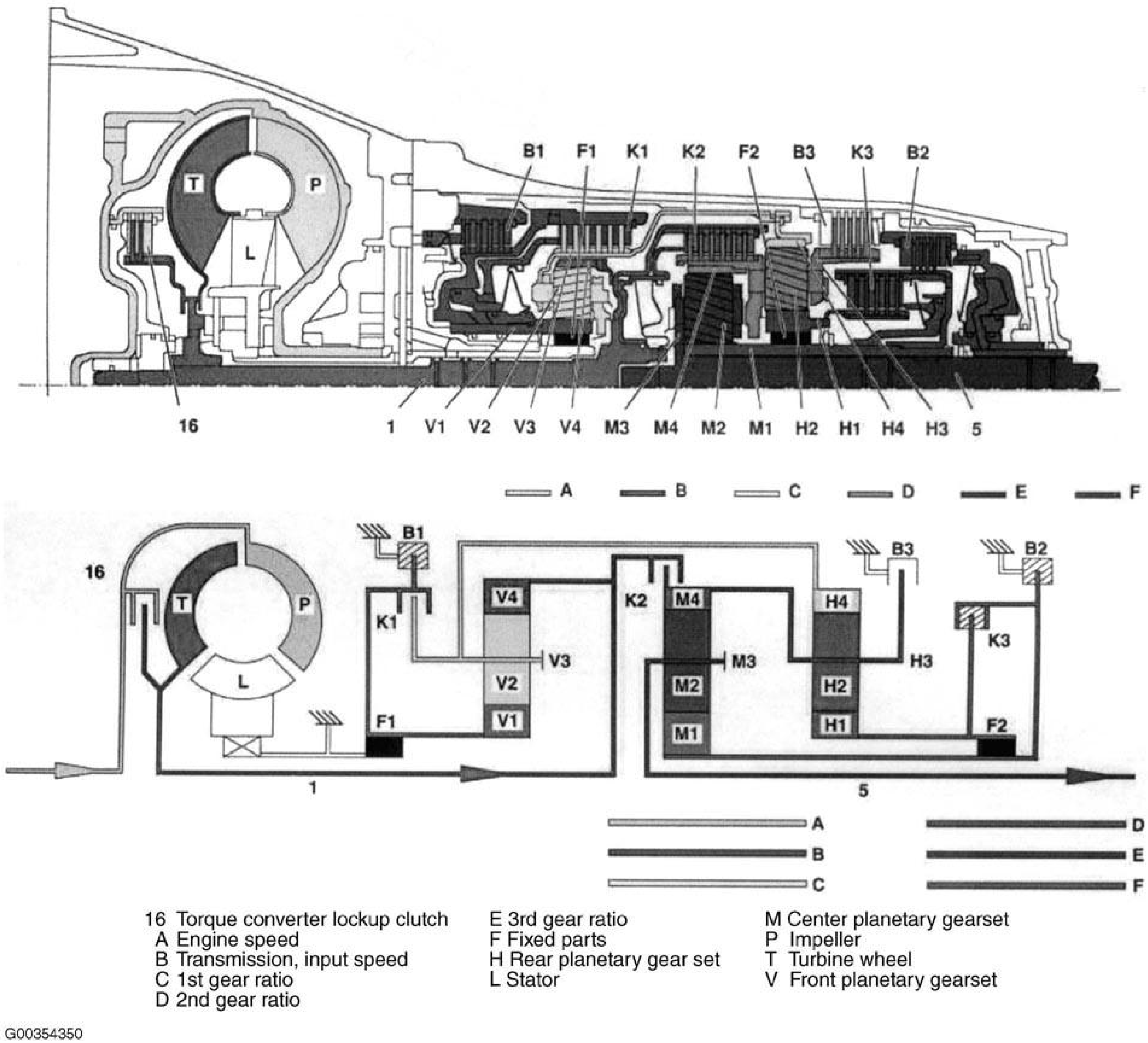


Fig. 118: Power Flow In 1st Gear, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Principal of power transmission in 1st gear

The torque coming from the torque converter is increased and transmitted to the output shaft (5) via the input shaft (1), involving all three planetary gear sets. See **Fig. 118**.

The following are not engaged:

- Front Multi-Disc Clutch (K1)

- Center Multi-Disc Clutch (K2)
- Center Multi-Disc Brake (B3)

Front Planetary Gear Set

The input shaft (1) drives the internal gear (V4). In drive mode the sun gear (V1) is supported via the locked freewheel F1 and in overrun mode via the engaged front multi-disc brake (B1) in the housing (B1). The planetary gears (V2) roll over the fixed sun gear (V1) and provide an increase in torque between the internal gear (V4) and the planet carrier (V3). The planet carrier (V3) moves at reduced speed in the direction of engine rotation.

Rear Planetary Gear Set

The internal gear (H4) turns at a reduced speed because of its mechanical connection to the front planet carrier (H3). The sun gear (H1) is supported via the engaged rear multi-disc brake (B2) and in drive mode via the locked freewheel (F2), in overrun mode via the engaged rear multi-disc clutch (K3) in the housing. The planet gears (H2) roll over the fixed sun gear (H1) and provide an increase in torque between the internal gear (H4) and the planet carrier (H3). The planet carrier (H3) moves at a reduced speed in the direction of engine rotation.

Center Planetary Gear Set

The ring gear (M4) is driven at the same speed as the rear planet carrier (H3) as a result of a mechanical connection. The sun gear (M1) is supported in the housing via the rear multi-disc brake (B2) (M1). The planet gears (M2) roll over the fixed sun gear (M1) and provide an increase in torque between the internal gear (M4) and the planet carrier (M3). The output shaft (5) connected to the planet carrier (M3) turns at a reduced speed in the running direction of the engine.

Torque Converter, Location/Task/Design/Function

See **TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of Freewheel

See **LOCATION/TASK/DESIGN/FUNCTION OF FREEWHEEL**.

PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION

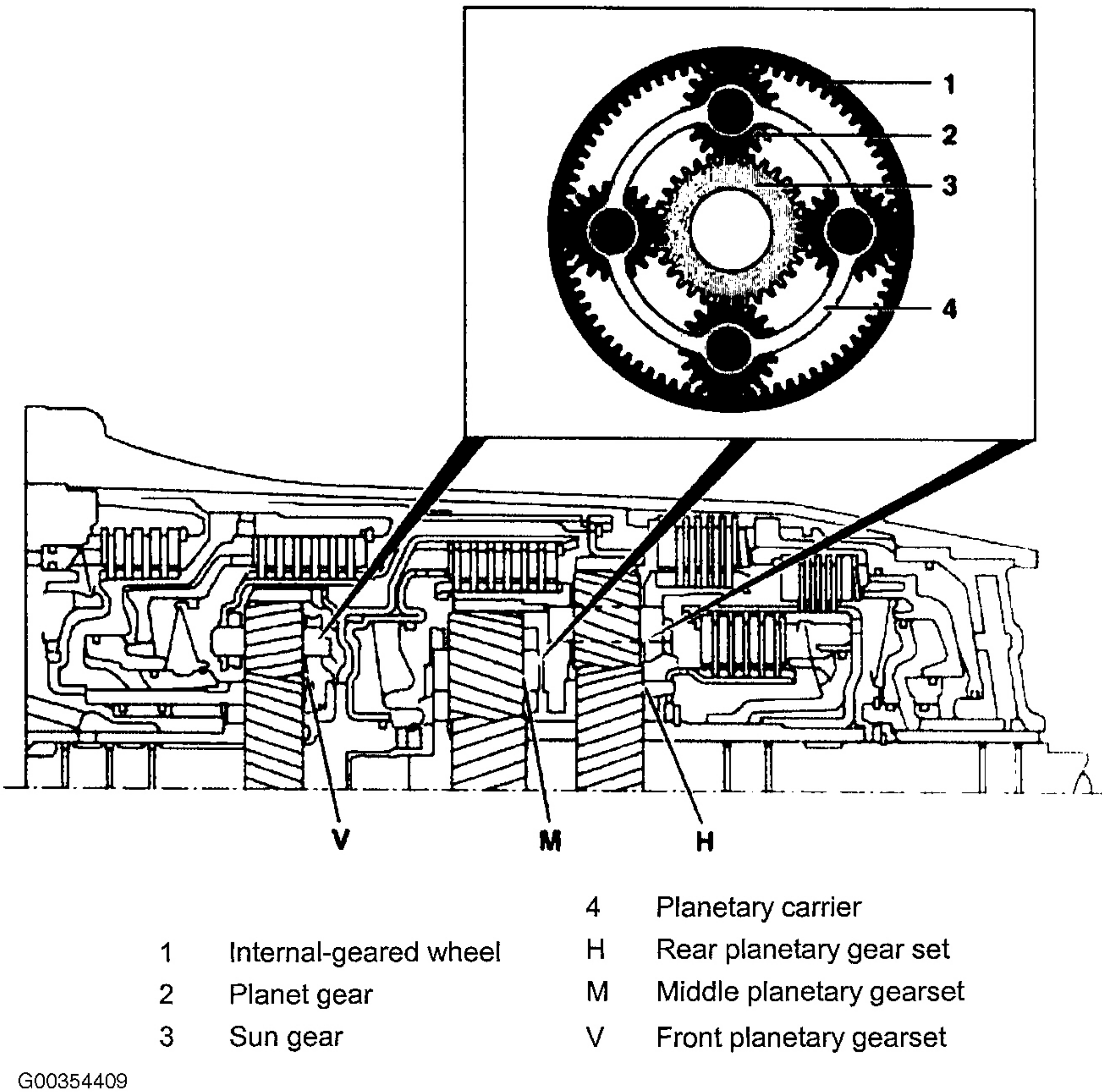


Fig. 119: Planetary Gear Set, Location/Task/Design/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Planetary Gear Set, Location

Three planetary gear sets are used to produce the different gear ratios. These are located in the mechanical part of the transmission as the front, center and rear planetary gear set (V, M, H).

Planetary Gear Set, Task

Power transmission and production of different gear ratios.

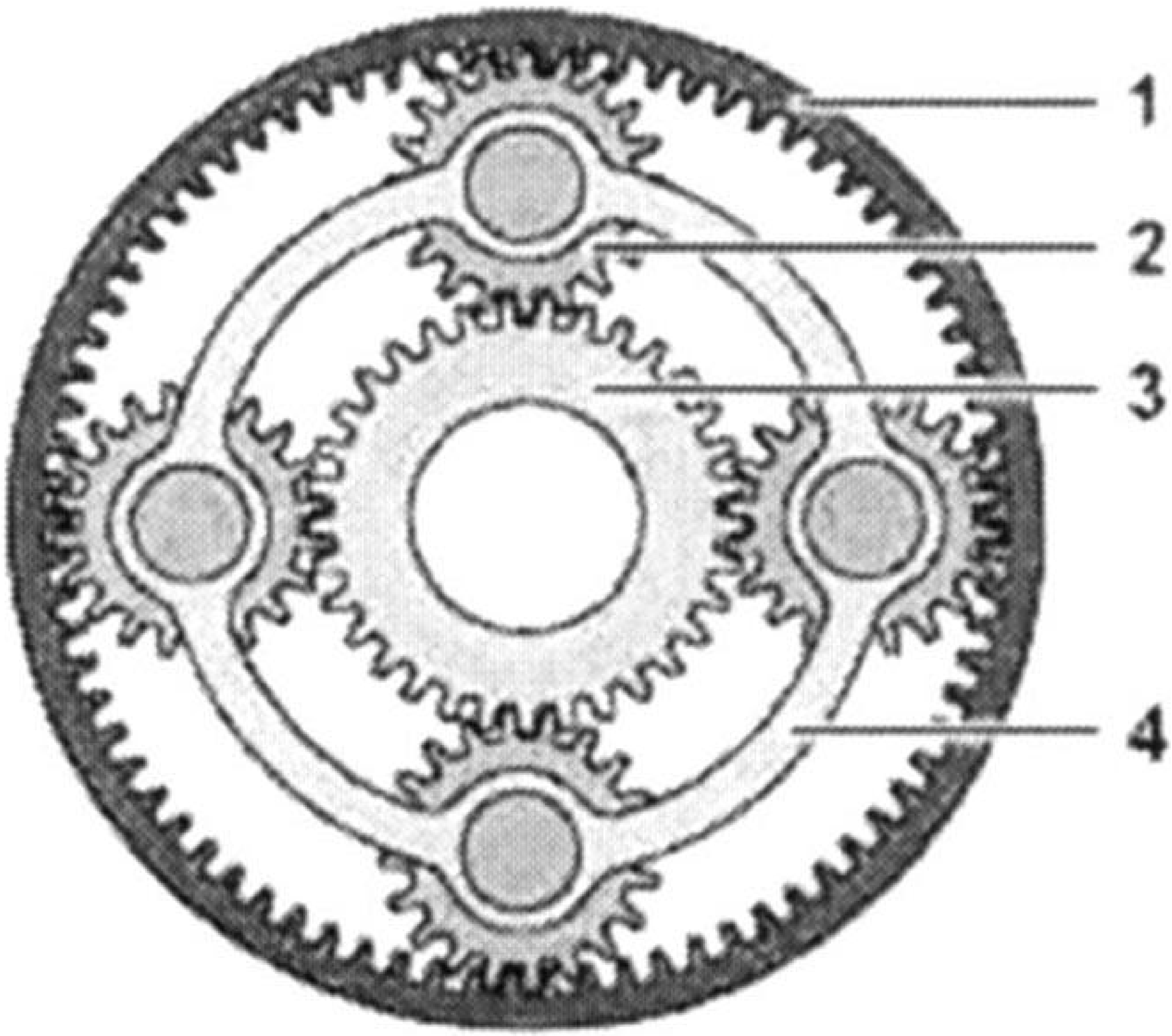
Planetary Gear Set, Design

A planetary gear set consists of the ring gear (1), the planet gears (2) carried in the planet carrier (4) and the sun gear (3).

Planetary Gear Set, Function

See **PLANETARY GEAR SET, FUNCTION**.

Planetary Gear Set, Function



1	Internal-geared wheel
2	Planet gear
3	Sun gear
4	Planetary carrier

Fig. 120: Planetary Gear Set, Function (1 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The ring gear (1) and sun gear (3) elements of a planetary gear system are alternately driven and braked by the actuating elements of the multi-plate clutch and multiple-disc brake. The planet gears (2) can turn on the internal gearing of the ring gear (1) and on the external gearing of the sun gear (3). This allows for a variety of gear ratios and the reversal of the rotation direction without the need for moving gear wheels or shift collars.

The torque and speed are converted corresponding to the lever ratios or the ratio of the number of teeth on the driven to the driving gears and is known as the gear ratio i. The overall ratio of a number of planetary gear sets connected in series is obtained by multiplying the partial ratios. When two components of the planetary gear set are locked together, the planetary gear set is locked and turns as a closed unit.

Advantages Of A Planetary Gear Set:

- Shifting ability under load.
- Several ratios can be produced.
- Constant meshing of the gears.
- Simple direction reversal.
- High efficiency.
- Coaxial location of input and output.
- Compact design.

The Following Basic Ratio Possibilities Can Be Realized

1.
    - Sun gear locked.
    - Ring gear driving.
    - Planet gears driven.
    - Relatively low step-down ratio.

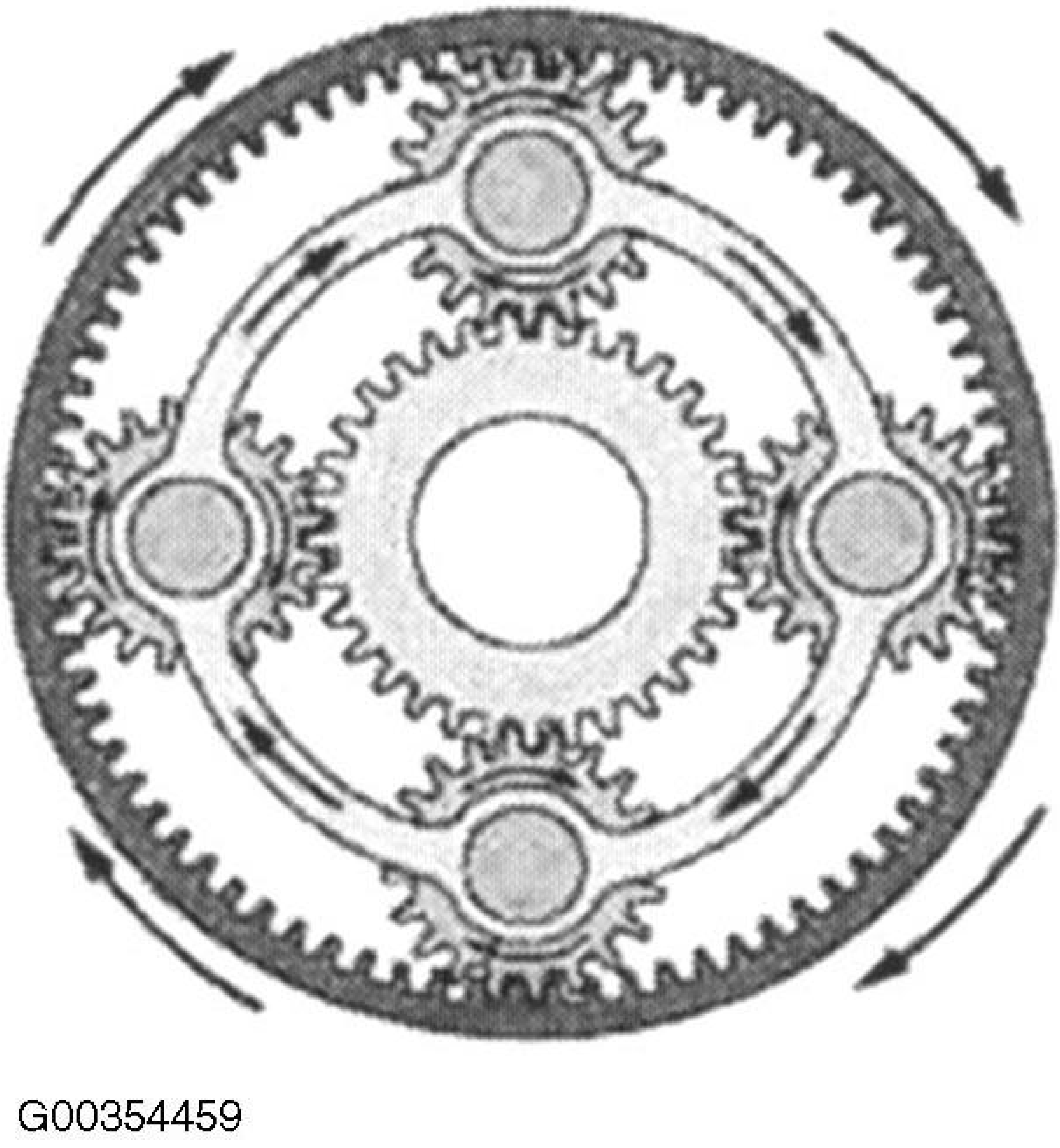


Fig. 121: Planetary Gear Set, Function (2 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

2.

- Hollow gear locked.
- Sun gear driving.
- Planet gears driven.
- Relatively high step-down ratio.

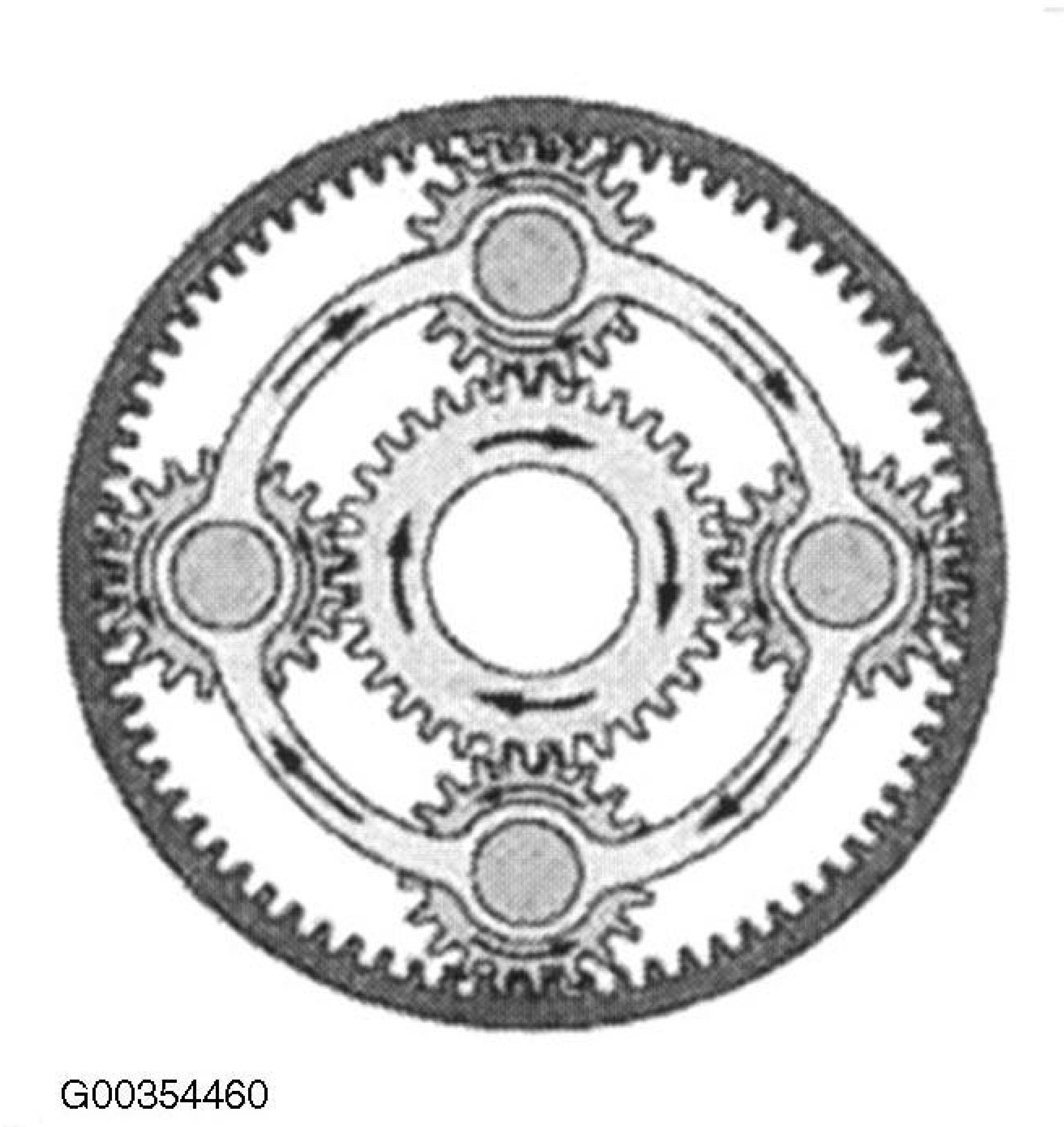


Fig. 122: Planetary Gear Set, Function (3 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

3. Locking two elements together so that the planetary gear set turns as a unit, produces a direct power

transmission (i =1).

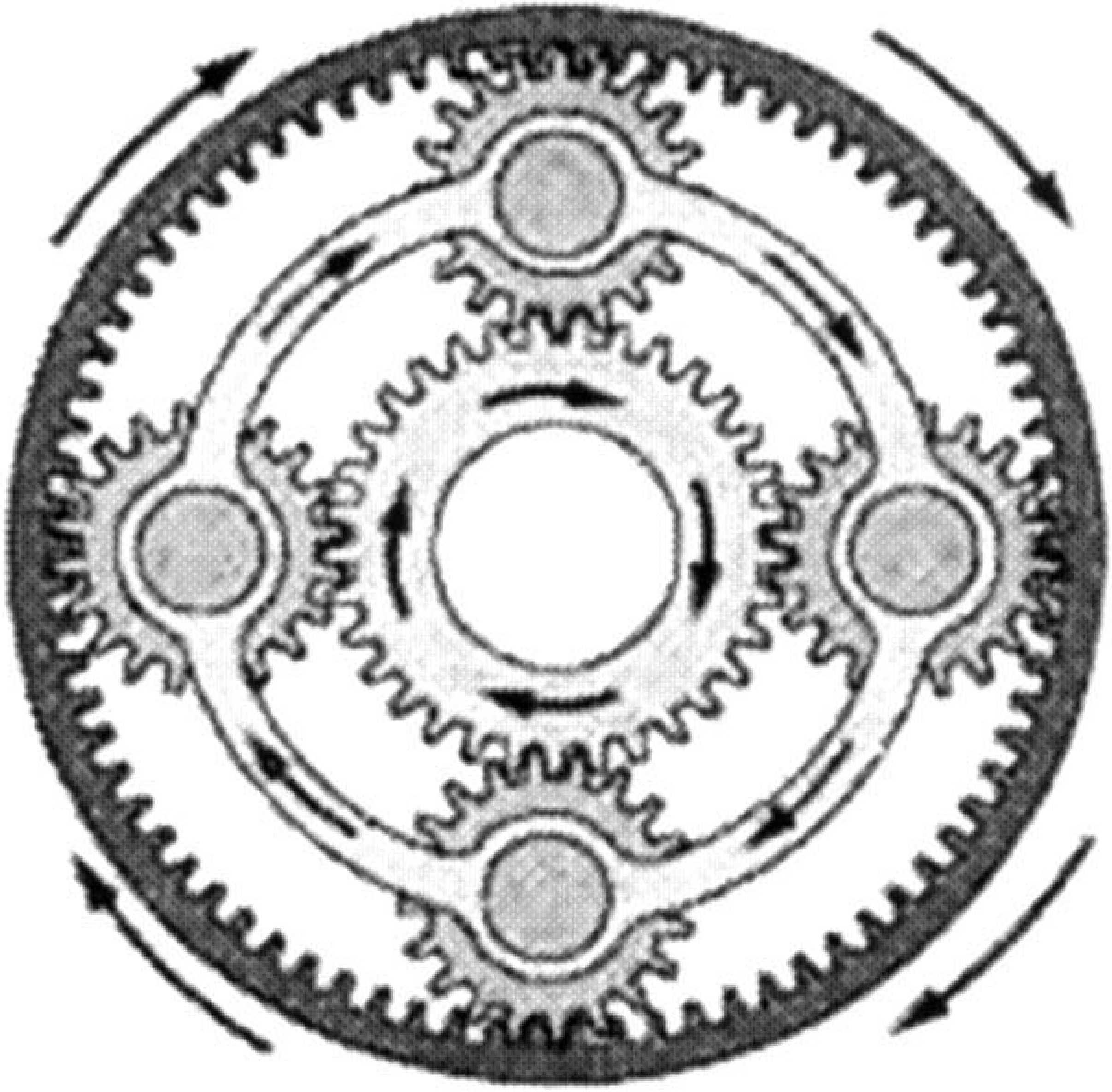


Fig. 123: Planetary Gear Set, Function (4 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

4.

- Planetary carrier locked.
- Sun gear driving.
- Ring gear driven.
- Direction reversal and step-down ratio.

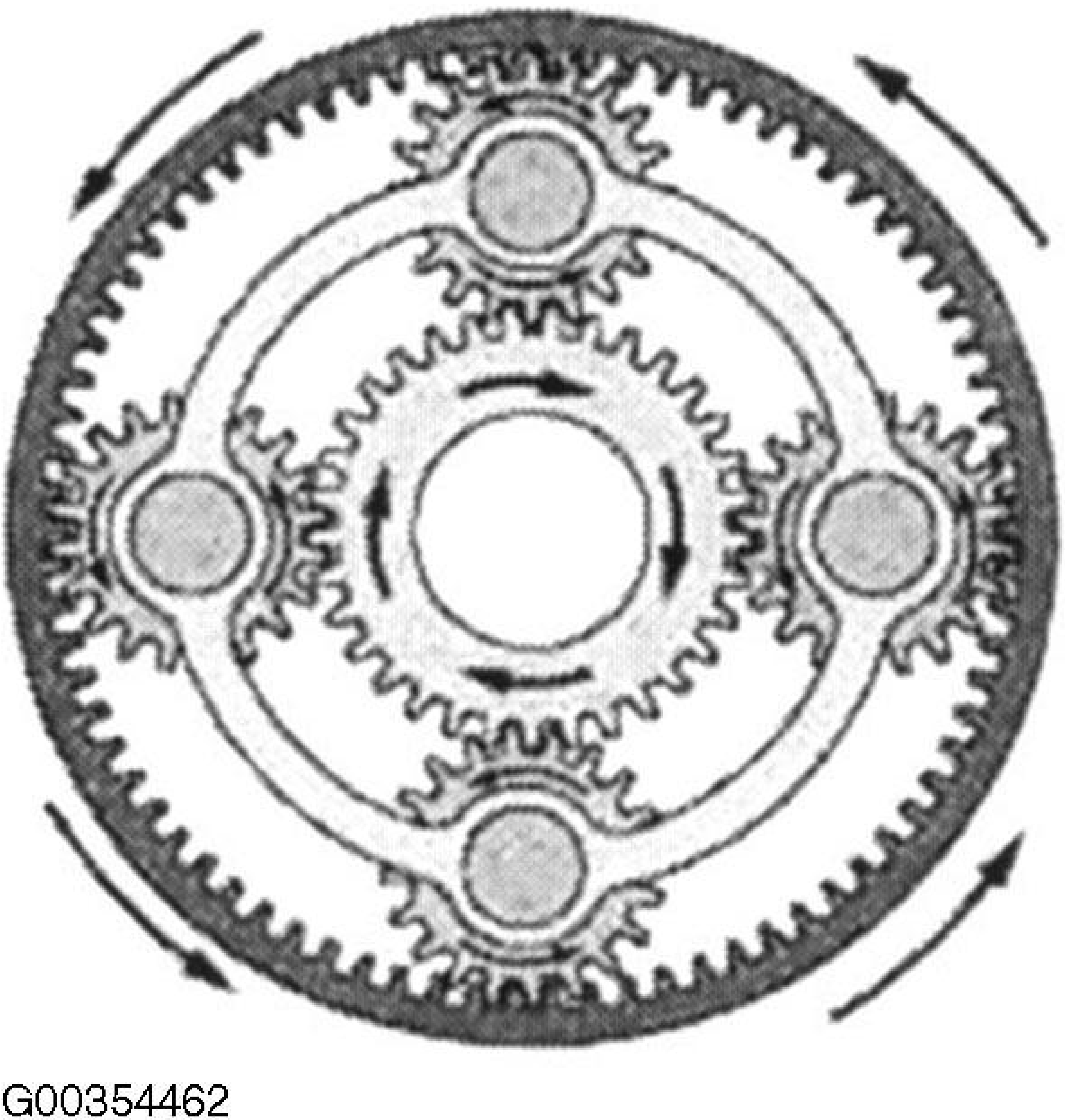


Fig. 124: Planetary Gear Set, Function (5 Of 5)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Power Flow In 2nd Gear Function

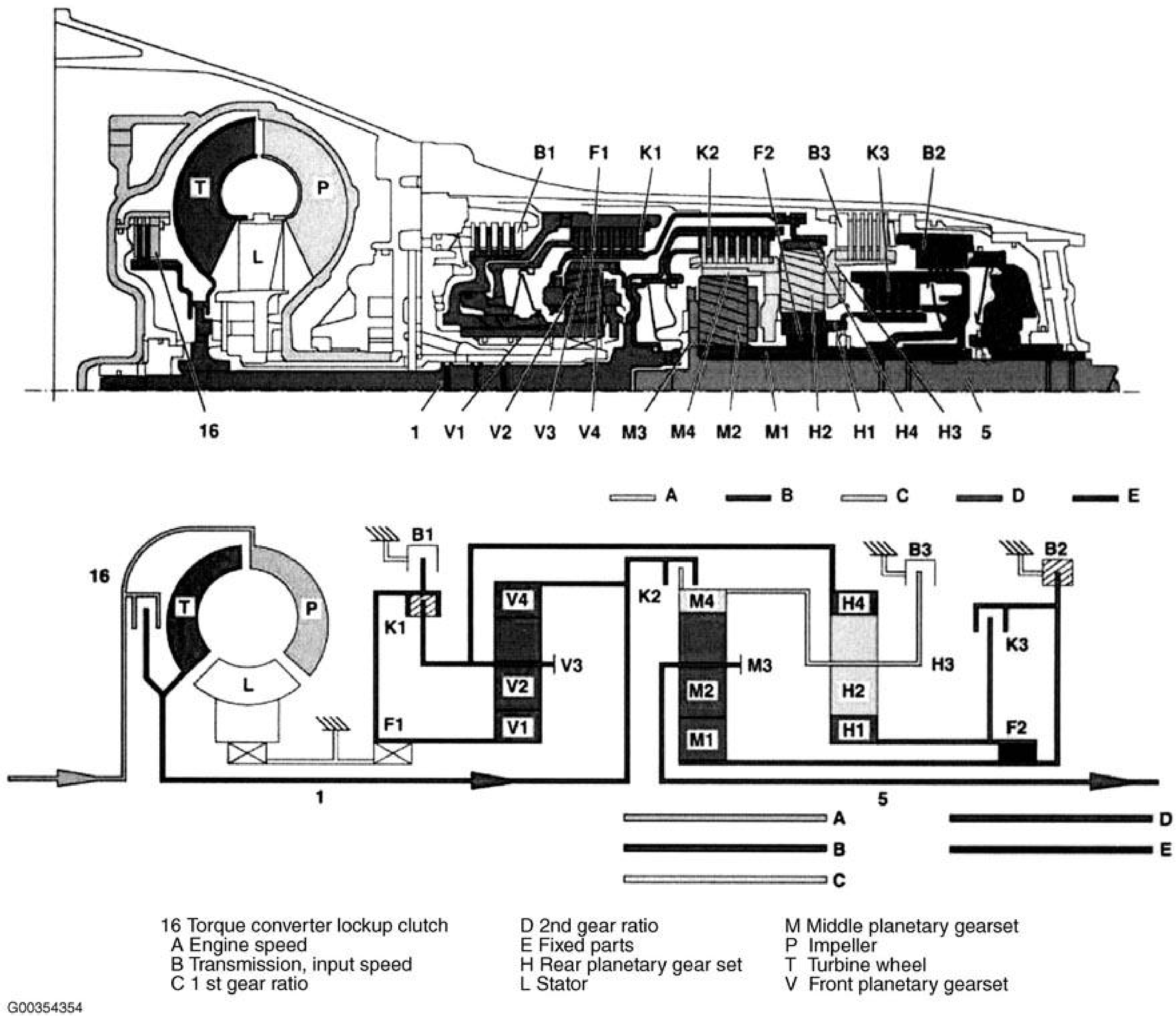


Fig. 125: Power Flow In 2nd Gear Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Principals of power transmission in 2nd gear

Torque from the torque converter is increased via the propeller shaft (1) and the center and rear planetary gearsets and transferred to the output shaft (5). See **Fig. 125**.

The following are not engaged:

- Front Multi-Disc Brake (B1)
- Center Multi-Disc Brake (B3)

- Freewheel (F1)
- Center Multi-Disc Clutch (K2)

Front Planetary Gear Set

The planet carrier (V3) and sun gear (V1) are rigidly connected to each other via the engaged front multi-disc clutch (K1). The planetary gearset is therefore blocked and turns as a closed unit at the input speed due to the mechanical connection of the ring gear (V4) and propeller shaft.

Rear Planetary Gear Set

The internal gear (H4) turns at the input speed because of its mechanical connection to the front planet carrier (V3). The sun gear (H1) is supported via the engaged rear multi-disc brake (B2) and in drive mode via the locked freewheel (F2), in overrun mode via the engaged rear multi-disc clutch (K3) in the housing. The planet gears (H2) roll over the fixed sun gear (H1) and provide an increase in torque between the internal gear (H4) and the planet carrier (H3). The planet carrier (H3) moves at a reduced speed in the direction of engine rotation.

Center Planetary Gear Set

The ring gear (M4) is driven at the same speed as the rear planet carrier (H3) as a result of a mechanical connection. The sun gear (M1) is supported in the housing via the rear multi-disc brake (B2). The planet gears (M2) roll over the fixed sun gear (M1) and provide an increase in torque between the internal gear (M4) and the planet carrier (M3). The output shaft (5) connected to the planet carrier (M3) turns at a reduced speed in the running direction of the engine.

Torque Converter, Location/Task/Design/Function

See **TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of Freewheel

See **LOCATION/TASK/DESIGN/FUNCTION OF FREEWHEEL**.

Power Flow In 3rd Gear Function

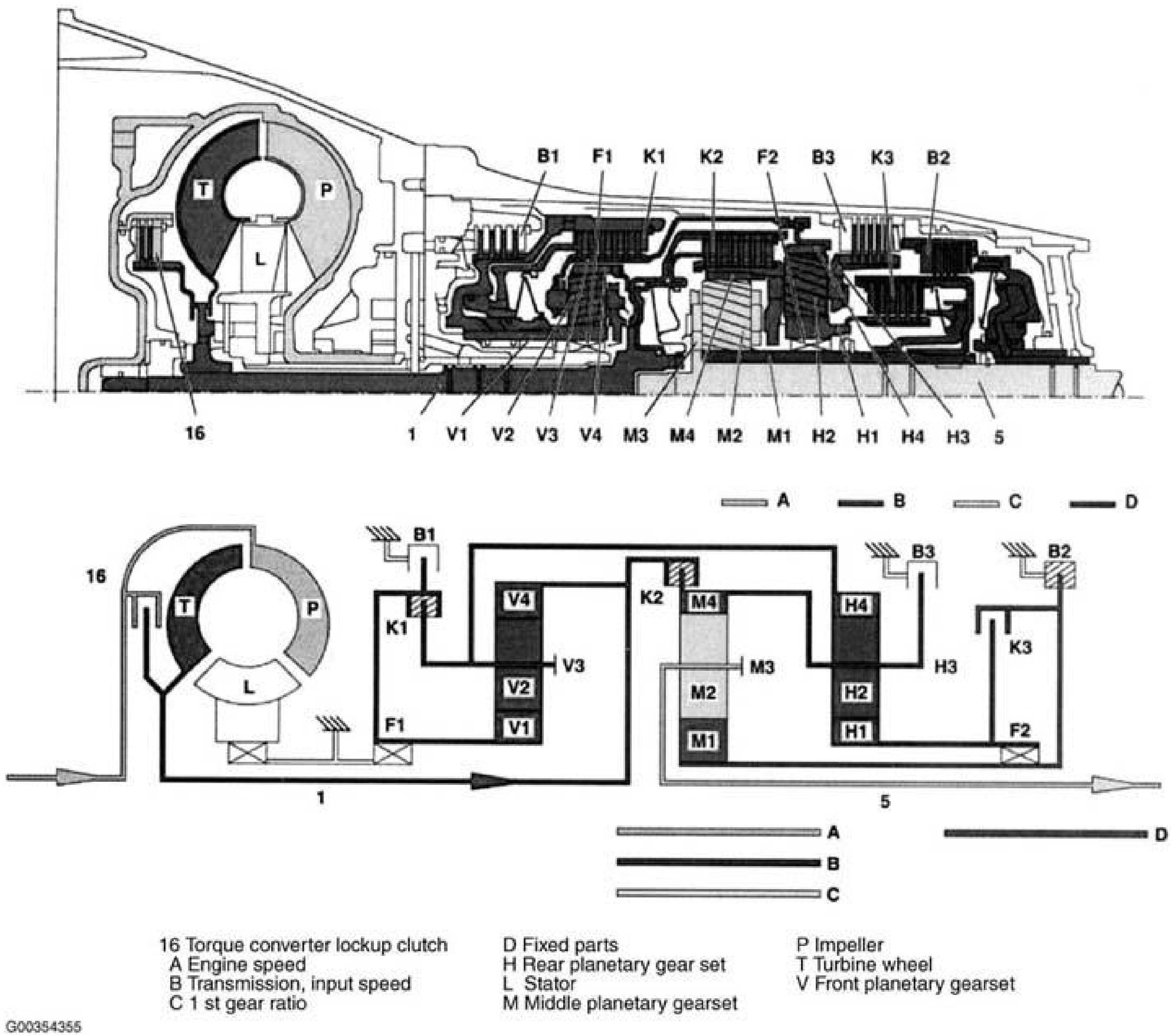


Fig. 126: Power Flow In 3rd Gear Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Principal of power transmission in 3rd gear

Torque from the torque converter is increased via the propeller shaft (1) and the center planetary gearset and transferred to the output shaft (5). See **Fig. 126**.

The following are not engaged:

- Front multi-disc brake (B1).
- Center multi-disc brake (B3).

- Freewheel F1.
- Freewheel F2.
- Rear multi-disc clutch (K3).

Front Planetary Gear Set

The planet carrier (V3) and sun gear (V1) are rigidly connected to each other via the engaged front multi-disc clutch (K1). The planetary gearset is therefore blocked and turns as a closed unit at the input speed due to the mechanical connection of the ring gear (V4) and propeller shaft.

Rear Planetary Gear Set

The center multi-disc clutch (K2) is engaged and transmits the input speed of the input shaft (1) to the planet carrier (H3) via the hollow gear (M4). The ring gear (H4) turns in the same way as the planet carrier (H3) due to the mechanical connection with the locked front planetary gearset. This planetary gearset is therefore locked and turns as a closed unit.

Center Planetary Gear Set

The hollow gear (M4) rotates at input speed due to the engaged center multi-disc clutch (K2). The sun gear (M1) is supported in the housing via the multi-disc brake (B2). The planet gears (M2) roll over the fixed sun gear (M1) and provide an increase in torque between the internal gear (M4) and the planet carrier (M3). The output shaft (5) connected to the planet carrier (M3) turns at a reduced speed in the running direction of the engine.

Torque Converter, Location/Task/Design/Function

See **TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Power Flow In 4th Gear Function

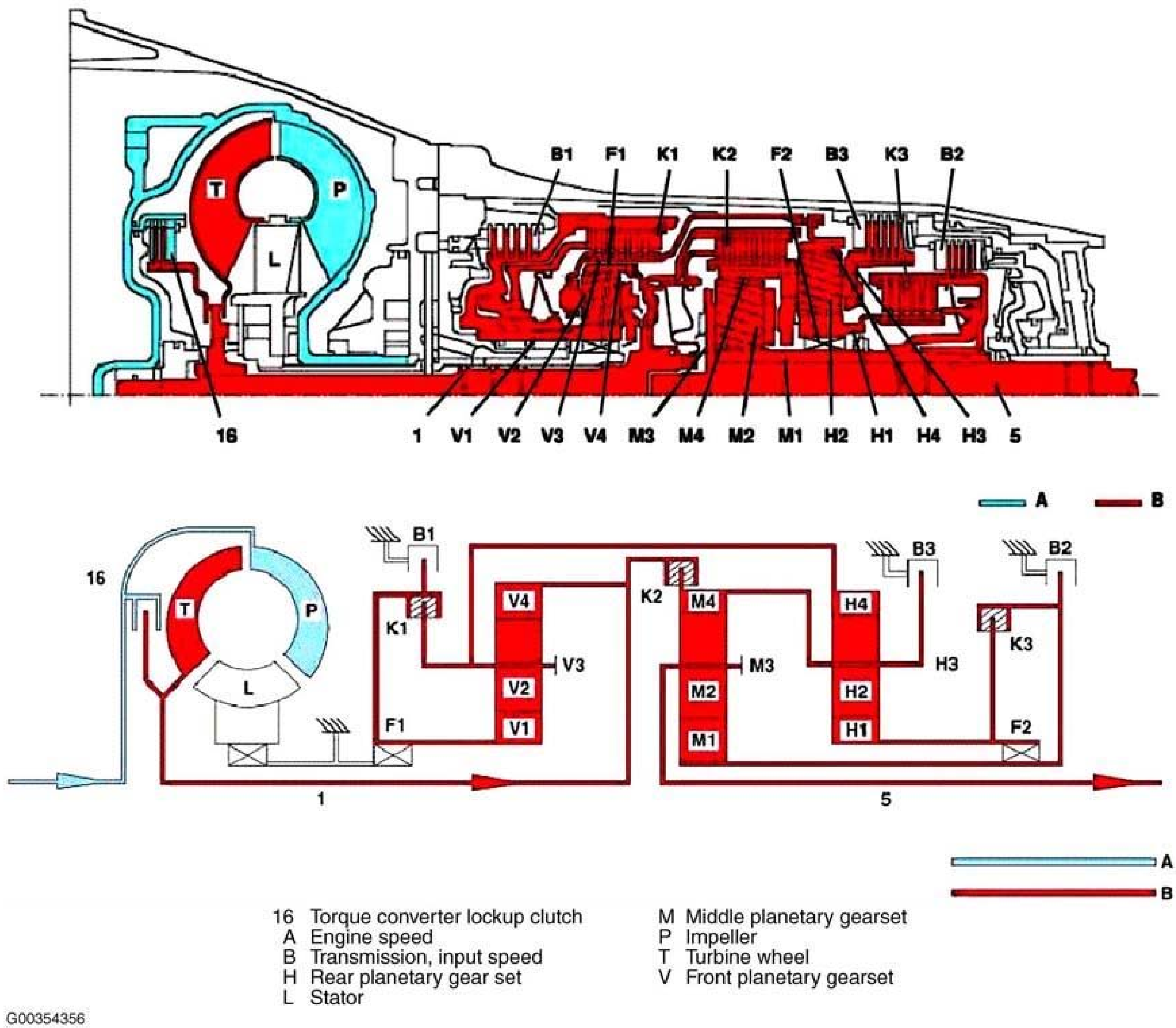


Fig. 127: Power Flow In 4th Gear Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Principal of power transmission in 4th gear

The direct drive ratio of 4th gear (i = 1) means that there is no torque and speed conversion. Power is transferred from the propeller shaft (1) to the input shaft (5) via three locked planetary gearsets (5). See **Fig. 127**.

The following are not engaged:

- Front Multi-Disc Brake (B1)
- Rear Multi-Disc Brake (B2)

- Center Multi-Disc Brake (B3)
- Freewheel F1
- Freewheel F2

Front Planetary Gear Set

The planet carrier (V3) and sun gear (V1) are rigidly connected with each other via the engaged front multi-disc clutch (K1). The planetary gearset is therefore blocked and turns as a closed unit at the input speed due to the mechanical connection of the ring gear (V4) and propeller shaft.

Rear Planetary Gear Set

The center multi-disc clutch (K2) is engaged and transmits the input speed of the input shaft (1) to the planet carrier (H3) via the hollow gear (M4). The ring gear (H4) turns in the same way as the planet carrier (H3) due to the mechanical connection with the locked front planetary gearset. This planetary gearset is therefore locked and turns as a closed unit.

Center Planetary Gear Set

The hollow gear (M4) rotates at input speed due to the engaged center multi-disc clutch (K2). The rear multi-disc clutch (K3) connects the sun gears of the center planetary gear set (M1) and the rear planetary gear set (H1). The planetary gearset is locked by the same speeds of the ring gear (M4) and the sun gear (M1) and it turns as a closed unit.

Torque Converter, Location/Task/Design/Function

See **TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Power Flow In 5th Gear Function

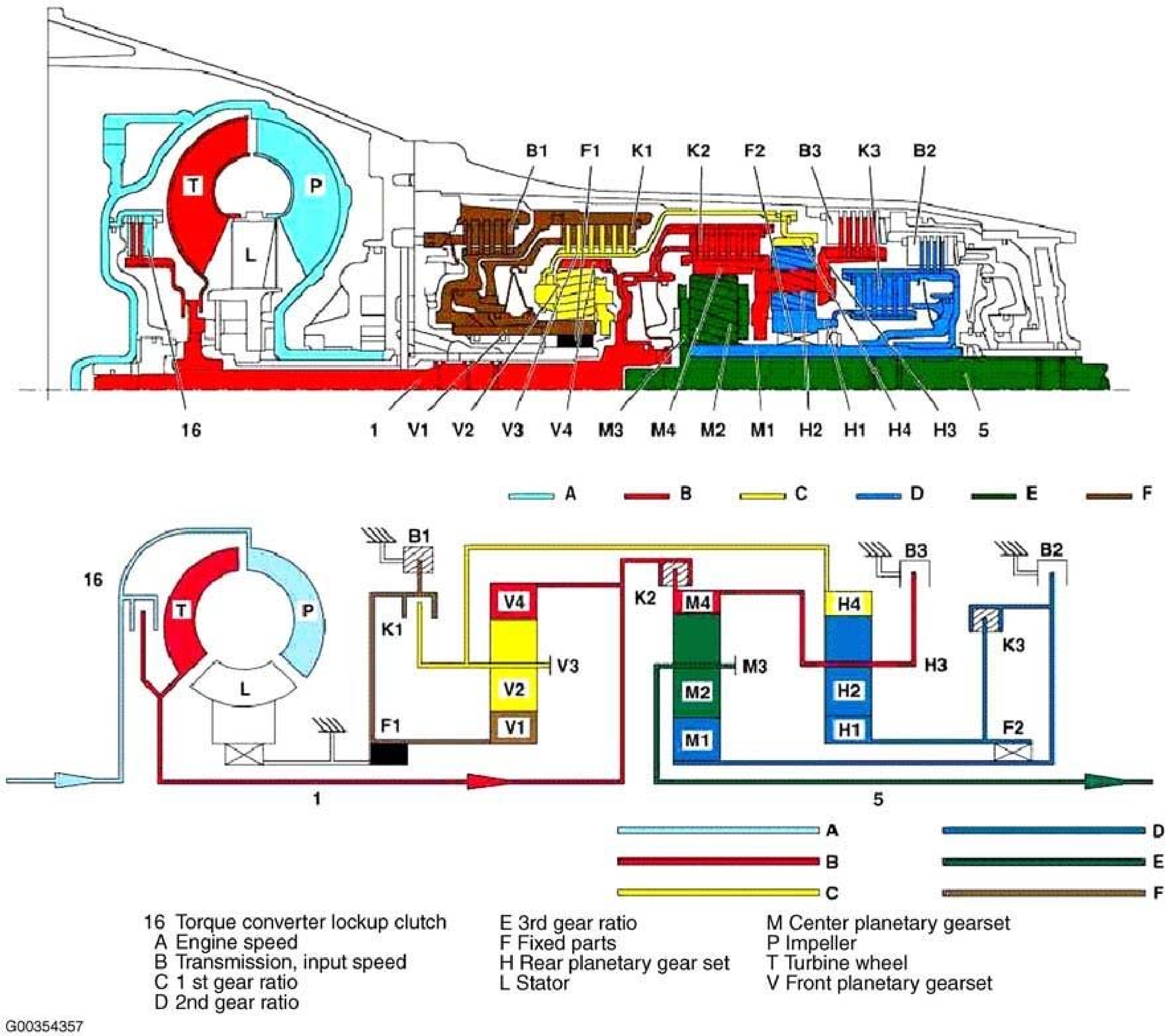


Fig. 128: Power Flow In 5th Gear Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Principles of power transmission in 5th gear

Torque from the torque converter is increased via the propeller shaft (1) and all three planetary gearsets and transferred to the output shaft (5). See **Fig. 128**.

The following are not engaged:

- Rear Multi-Disc Brake (B2)

- Center Multi-Disc Brake (B3)
- Freewheel F2
- Front Multi-Disc Clutch (K1)

Front Planetary Gear Set

The input shaft (1) drives the internal gear (V4). In the drive mode the sun gear (V1) is supported via the locked freewheel (f1) and in overrun mode in the housing via the engaged front multi-disc brake (B1). The planet gears (V2) roll over the fixed sun gear (V1) and provide an increase in torque between the internal gear (V4) and the planet carrier (V3). The planet carrier (V3) moves at reduced speed in the direction of engine rotation.

Rear Planetary Gear Set

The center multi-disc clutch (K2) is engaged and transmits the input speed of the input shaft (1) to the planet carrier (H3) via the hollow gear (M4). The internal gear (H4) turns at a reduced speed because of its mechanical connection to the front planet carrier (V3). The planet gears (H2) turn between the ring gear (H4) and the sun gear (H1). The sun gear (H1) moves at increased speed in the direction of engine rotation.

Center Planetary Gear Set

The hollow gear (M4) rotates at input speed due to the engaged center multi-disc clutch (K2). The rear multi-disc clutch (K3) transmits a higher speed to the sun gear (M1) due to the connection to the sun gear (H1). The planet gears (M2) turn between the ring gear (M4) and the sun gear (M1). The speed of the planet carrier (M3) and the output shaft connected to the planet carrier (5) lies between that of the ring gear (M4) and the sun gear (M1). This provides a step-up ratio.

Torque Converter, Location/Task/Design/Function

See **TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**. .

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Power Flow In Reverse, Function (Without Touch Shift)

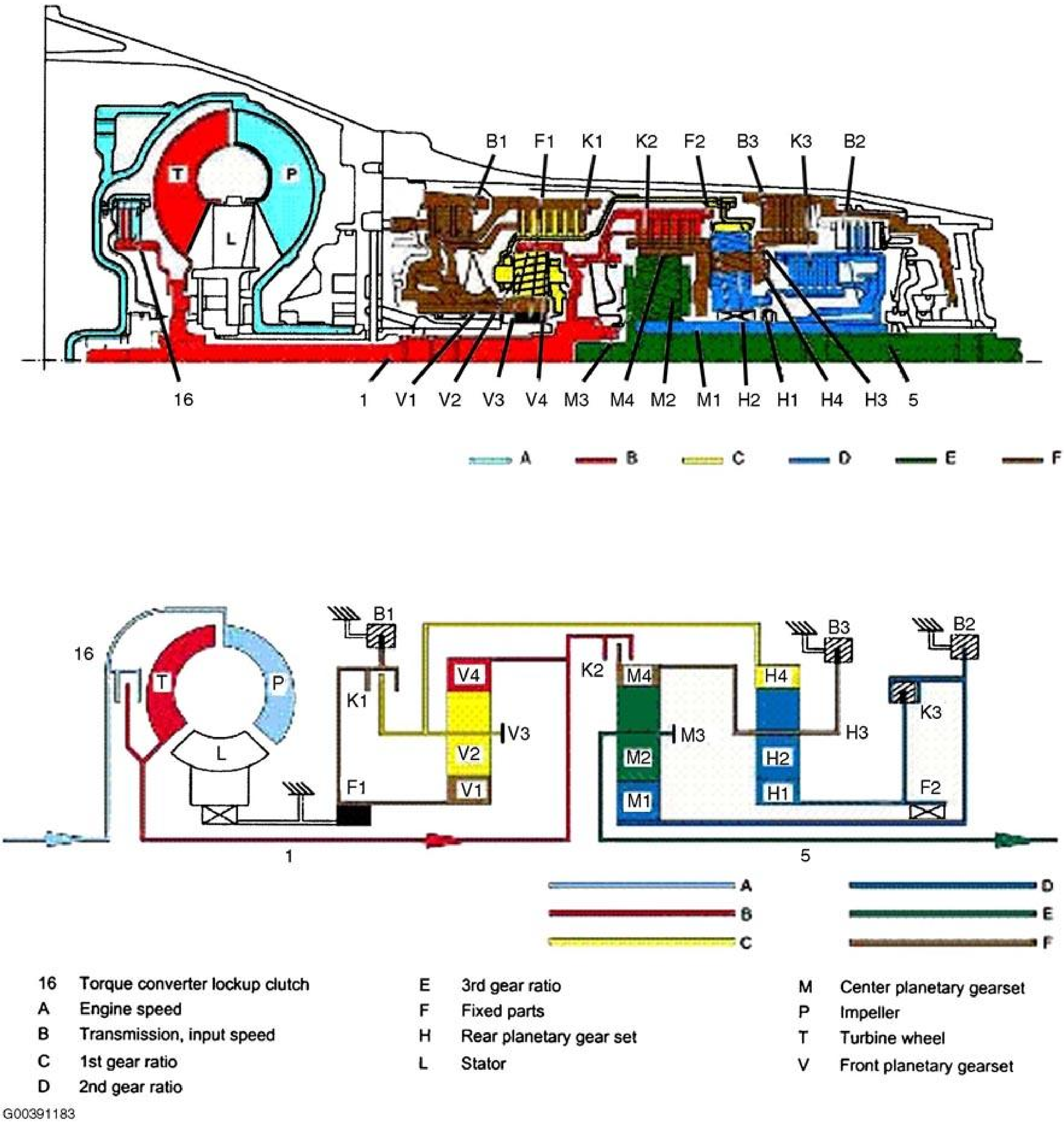


Fig. 129: Power Flow In Reverse, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Principle Of Power Transmission In Reverse Gear.

Torque from the torque converter is increased via the propeller shaft (1) and all three planetary gearsets and transferred with reversed direction of rotation to the output shaft (5). See **Fig. 129**.

The following are not engaged:

- Rear Multi-Disk Brake (B2)
- Freewheel F2
- Front Multi-Disk Clutch (K1)

Front Planetary Gear Set.

The input shaft (1) drive the internal gear (V4). In drive mode the sun gear (V1) is supported via the locked freewheel (F1) and in overrun mode in the housing via the engaged front multi-disk brake (B1). The planet gears (V2) roll over the fixed sun gear (V1) and provide an increase in torque between the internal gear (V4) and the planet carrier (V3). The planet carrier (V3) moves at reduced speed in the direction of engine rotation.

Rear Planetary Gear Set.

The planet carrier (H3) is held securely in the housing due to the engaged center multi-disk brake (B3). The internal gear (H4) turns at a reduced speed because of its mechanical connection to the front planet carrier (V3). The planet gears (H2) turn between the ring gear (H4) and the sun gear (H1). The direction is reversed due to the securely held planet carrier (H3) so that the sun gear (H1) rotates in the opposite direction to the engine.

Center Planetary Gear Set.

The hollow gear (M4) is held securely in the housing by the center multi-disk brake (B3) via the mechanical connection to the planet carrier (H3). The sun gear (M1) rotates backwards due to the engaged rear multi-disk clutch (K3). The planet gears (M2) roll over the fixed internal gear (M4) and provide an increase in torque between the sun gear (M1) and the planet carrier (M3). The output shaft (5) connected to the planet carrier (M3) turns at a reduced speed in the opposite direction to the running direction of the engine.

Torque Converter, Location/Task/Design/Function

See **TORQUE CONVERTER, LOCATION/TASK/DESIGN/FUNCTION**.

Planetary Gear Set, Location/Task/Design/Function

See **PLANETARY GEAR SET, LOCATION/TASK/DESIGN/FUNCTION**. .

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multi-Plate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of Freewheel

See **LOCATION/TASK/DESIGN/FUNCTION OF FREEWHEEL**.

Function Of Gear Shift (With Touch Shift)

Transmission with touch shift.

On transmission 722.6 the electrohydraulic control unit converts the electric signals going out from the electronic transmission control (EGS) into hydraulic signals.

Faults occurring in the ETC control unit (N15/3) are handled by the limp-home system. The limp-home system is designed so that the driver can reach a Service Operation even under extreme conditions.

Selector lever position "P", "R", "N" and "D" are transmitted by the electronic selector lever module control unit (N15/5) on the Controller Area Network bus class C (engine compartment) (CAN-C) and in parallel to this by means of a shift rod to the range selector lever at the transmission end. By touching or holding the selector lever towards "+" or "-" the shift range is pre-selected and displayed in the instrument cluster (A1) until an upshift of transmission 722.6 is possible.

Function Of Gear Change

See **FUNCTION OF GEAR CHANGE**.

Emergency Default Mode, Function

See **LIMP-HOME MODE, FUNCTION**.

Function Of Manual Drive Mode Selection

Oil Level Control, Function

See **OIL LEVEL CONTROL, FUNCTION**.

Torque Converter Lockup Clutch Control, Function

See **FUNCTION OF TORQUE CONVERTER LOCKUP CLUTCH CONTROL**.

Function Of Gear Shift (Without Touch Shift)

On transmission 722.6 the electrohydraulic control unit converts the electric signals going out from the electronic transmission control (EGS) into hydraulic signals.

Faults occurring in the ETC control unit (N15/3) are handled by the limp-home system. The limp-home system is designed so that the driver can reach a Service Operation even under extreme conditions.

Selector lever position "P", "R", "N" and "D" are transmitted by the electronic selector lever module control unit

(N15/5) on the Controller Area Network bus class C (engine compartment) (CAN-C) and in parallel to this by means of a shift rod to the range selector lever at the transmission end. By touching or holding the selector lever towards "+" or "-" the shift range is pre-selected and displayed in the instrument cluster (A1) until an upshift of transmission 722.6 is possible.

Function Of Gear Change

See **FUNCTION OF GEAR CHANGE**.

Emergency Default Mode, Function

See **LIMP-HOME MODE, FUNCTION**.

Oil Level Control, Function

See **OIL LEVEL CONTROL, FUNCTION**.

Torque Converter Lockup Clutch Control, Function

See **FUNCTION OF TORQUE CONVERTER LOCKUP CLUTCH CONTROL**.

Function Of Gear Change

Operation

Every gear change is triggered by the electronic transmission control (ECT). Each shift sequence is assigned a control block. Each of these contains one overlap regulating valve, one holding pressure shift valve, one shift pressure shift valve, one common command valve and one electromagnetically actuated switchover valve (upshift/downshift solenoid valve).

Actuation of the solenoid valve switches over from stationary mode to the shift phase.

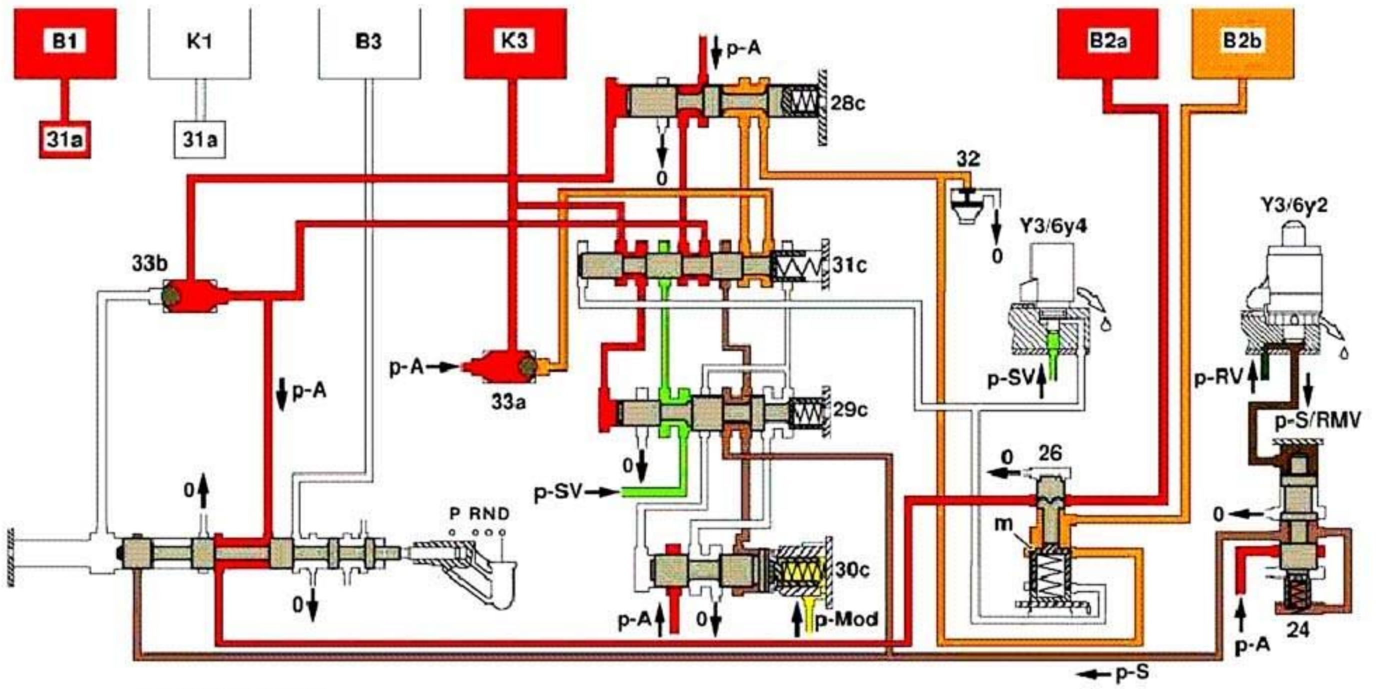
When the gear change is complete the solenoid valves are no longer actuated as the different gears are subject to a self-hold function in stationary mode.

Shifting "N" To "D" (1st Gear), Function

See **SHIFTING N TO D (1ST GEAR), FUNCTION**.

Shifting N To D (1st Gear), Function

Transmission 722.6 As Of 1.7.96

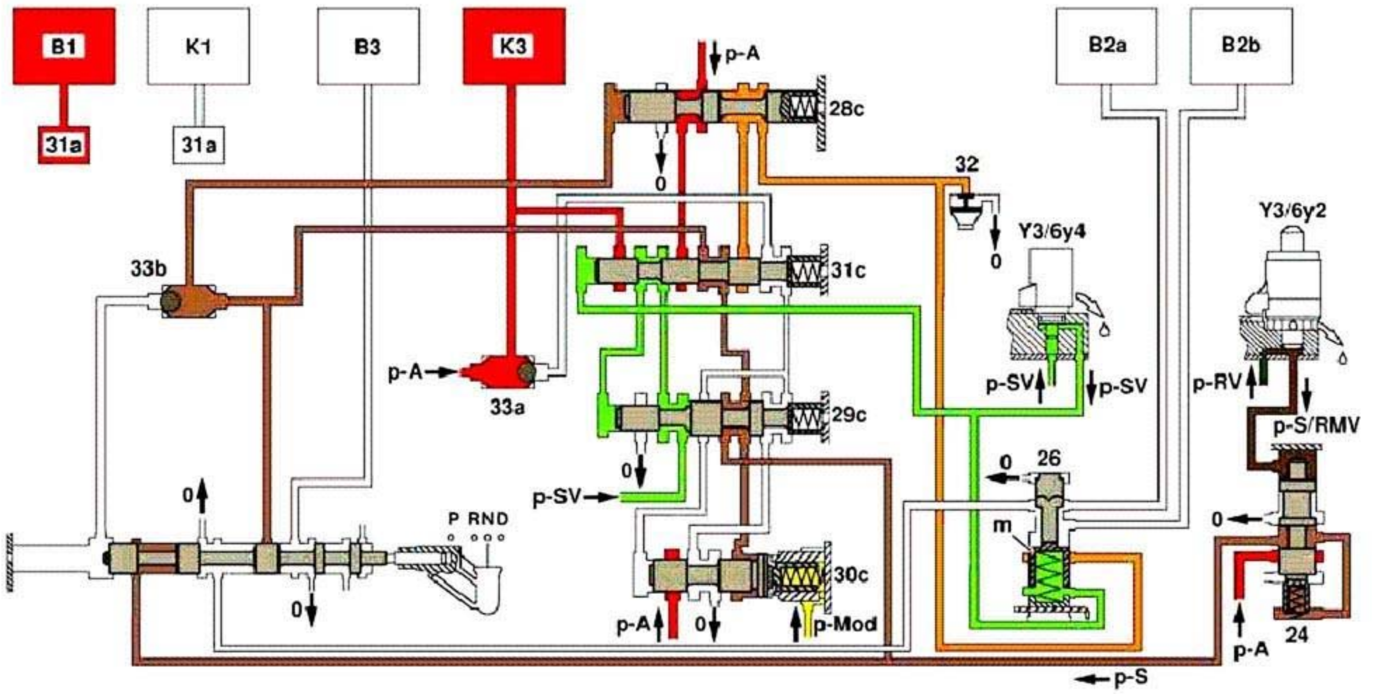


1 st gear engaged

0	Oil sump drain
24	Shift pressure regulating valve
26	Shift valve B2
28c	3-4 holding pressure shift valve
29c	3-4 shift pressure shift valve
30c	3-4 overlap regulating valve
31a	1-2/4-5 command valve
31c	3-4 command valve
32	Pressure maintaining valve
33a	Ball valve
33b	Ball valve
52	Selector valve
B1	Front multi-disk brake
B2a	Rear multi-disk brake piston
B2b	Opposed surface of rear multi-disk brake piston
B3	Center multi-disk brake
K1	Front multi-disk clutch
K3	Rear multi-disk clutch
m	Annular face
p-A	Working pressure
p-Mod	Modulating pressure
p-RV	Regulating valve pressure
p-S	Shift pressure
p-S/RMV	Shift pressure regulating solenoid valve
p-SV	Shift valve pressure
Y3/6y2	Shift pressure regulating solenoid valve
Y3/6y4	3-4 shift solenoid valve

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Fig. 130: Shifting N To D (1st Gear), Function (1st Gear Engaged)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



Engine started

0 Oil sump drain
24 Shift pressure regulating valve
26 Shift valve B2
28c 3-4 holding pressure shift valve
29c 3-4 shift pressure shift valve
30c 3-4 overlap regulating valve
31a 1-2/4-5 command valve
31c 3-4 command valve
32 Pressure maintaining valve
33a Ball valve
33b Ball valve
52 Selector valve
B1 Front multi-disk brake
B2a Rear multi-disk brake piston
B2b Opposed surface of rear multi-disk brake piston
B3 Center multi-disk brake
K1 Front multi-disk clutch
K3 Rear multi-disk clutch
m Annular face
p-A Working pressure
p-Mod Modulating pressure
p-RV Regulating valve pressure
p-S Shift pressure
p-S/RMV Shift pressure regulating solenoid valve
p-SV Shift Valve Pressure
Y3/6y2 Shift pressure regulating solenoid valve
Y3/6y4 3-4 shift solenoid valve

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Fig. 131: Shifting N To D (1st Gear), Function (Engine Started)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

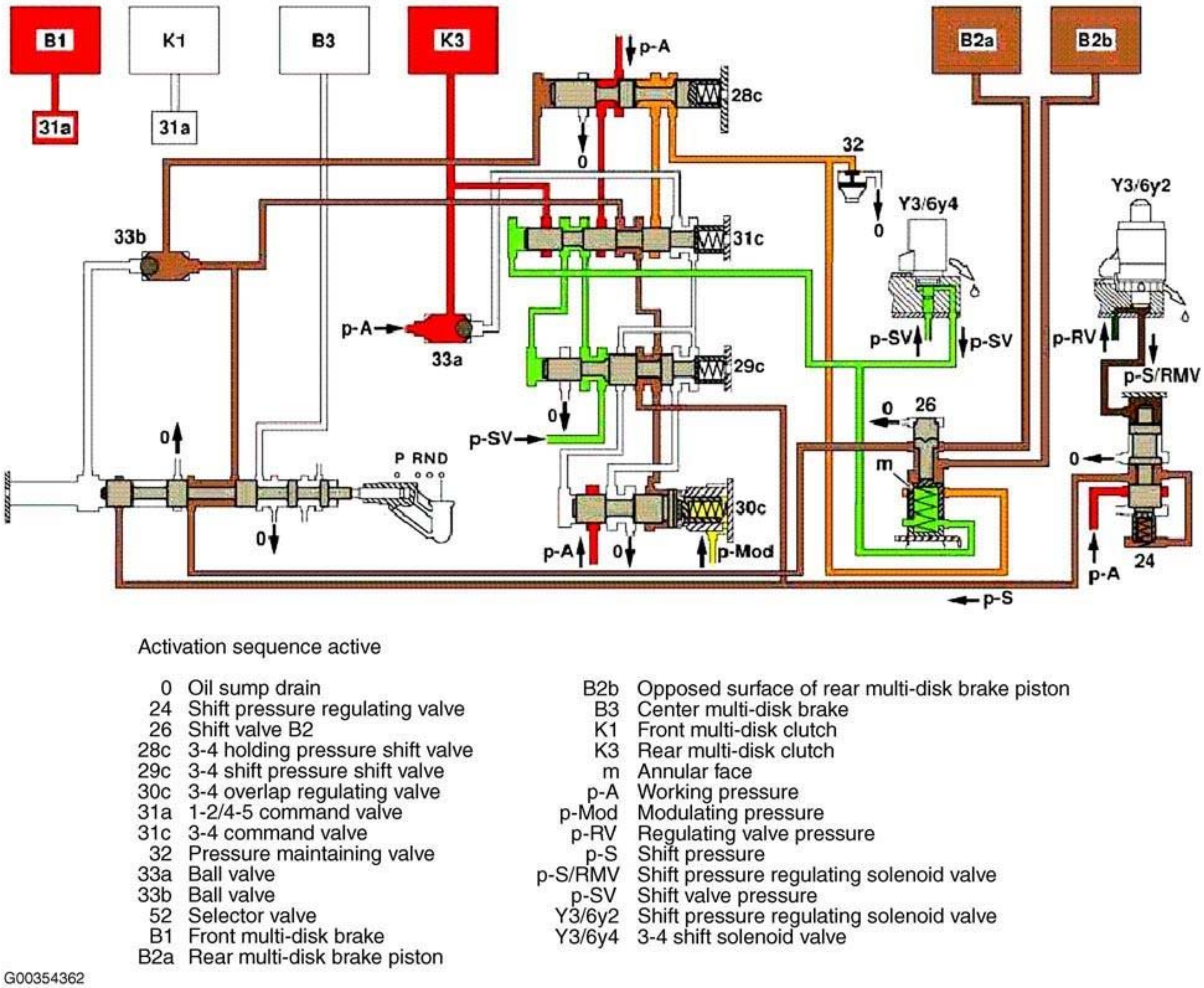


Fig. 132: Shifting N To D (1st Gear), Function (Activation Sequence Active)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Initial Situation:

- Selector lever in position "N" or "P".
- Engine off.
- No pressure in hydraulic system.
- All valves in the shift plate in neutral position.

Aim

To engage 1st gear with program "S" selected.

Shifting 2nd gear with program selection "W" or "C" (depending on the production period).

Function

Start engine -

The working pressure (p-A) is formed, reaches via the holding pressure 2-3 shift valve, the command valve 2-3 and ball valve (33a) to the rear multi-disc clutch (K3) and via the command valve 3-4 (31c) to the end face of the shift pressure 3-4 (29c) shift valve. The 3-4 shift pressure shift valve (29c) is moved against the force of the spring towards the right. At the same time the 3-4 solenoid valve (Y3/6y4) is energized.

The ECT control unit (N15/3) monitors the engagement process via the reduced speed of the drive shaft as the frictional connection of the rear multi-disc brake increases. When the speed drops to the specified level, the ECT control module (N15/3) shuts off the power to the 3-4 shift solenoid valve (Y3/6y4). The spring chamber of the shift valve B2 (26) is depressurized and switches downward. As a result the line to the opposed surface of the rear multi-disc brake piston (B2b) is connected to the pressure maintaining valve (32). The pressure on the opposed surface of the rear multi-disc brake piston (B2b) reduces to a residual pressure.

The 3-4 command valve (31c) moves to the left. The working pressure (p-A) reaches via the holding pressure shift valve 3-4 (28c) and the command valve 3-4 (31c) to the piston of the rear multi-disc brake (B2a).

The activation sequence is complete; 1st gear is engaged (See **Fig. 130**.

As a result shift valve pressure (p-SV) reaches the spring chamber of the shift valve B2 (26) and the end face of the command valve 3-4 (31c).

The shift valve B2 (26) is held in the upper position and the 3-4 command valve (31c) switches towards the right.

The working pressure (p-a) is replaced by the shift valve pressure (p-SV) at the end face of the shift pressure 3-4 shift valve (See **Fig. 131**).

Move Selector Lever From "N" To "D"

The selector lever (52) opens the shift pressure (p-S) feed connection from the ball valve (33b) with the shift valve B2 (26). In the upper position of the shift valve B2 (26) shift pressure (p-S) reaches behind (p-S) the piston of the multi-disc brake (B2a) and simultaneously to the opposed surface of the rear multi-disc brake piston (B2b).

The rear multi-disc brake begins to close. See **Fig. 132**.

The pressure on the opposed surface of the piston of the rear multi-disc brake (B2b) causes a gentle engagement of the rear multi-disc brake.

Move Selector Lever From "N" To "R"

The selector valve (52) opens the connection of the feed of shift pressure (p-S) with the center multi-disc brake

(B3). The further sequence of the switch-on process is as when engaging the rear multi-disc brake.

NOTE: No mating surface on the piston of the center multi-disc brake (B3).

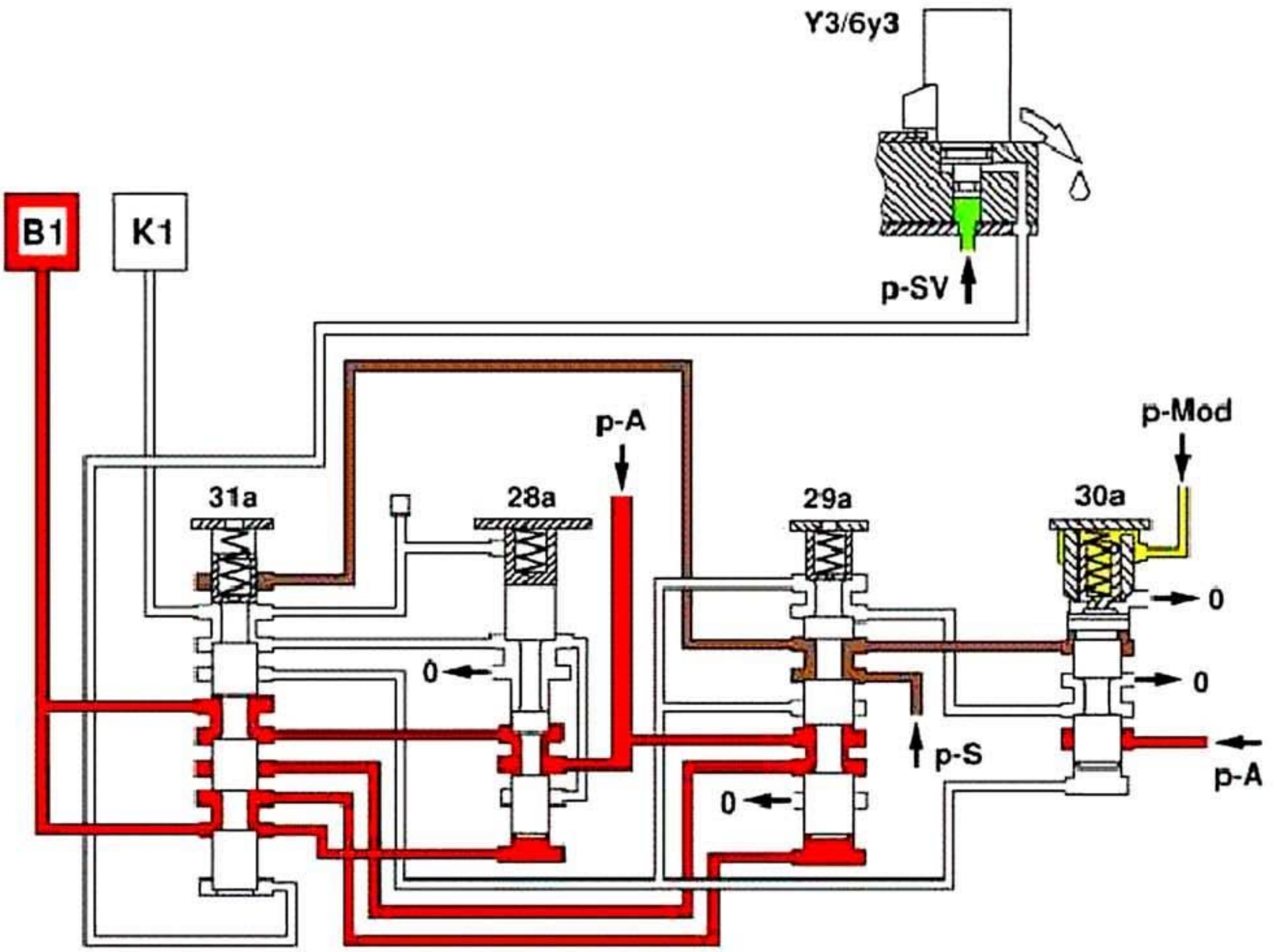
Residual Pressure

To avoid air getting into the hydraulic system, which causes a deterioration in shift quality, the line system remains filled with oil in steady-state operation of the automatic transmission.

Function Of Shift From 1 To 2

See **SHIFT FROM 1 TO 2, FUNCTION**.

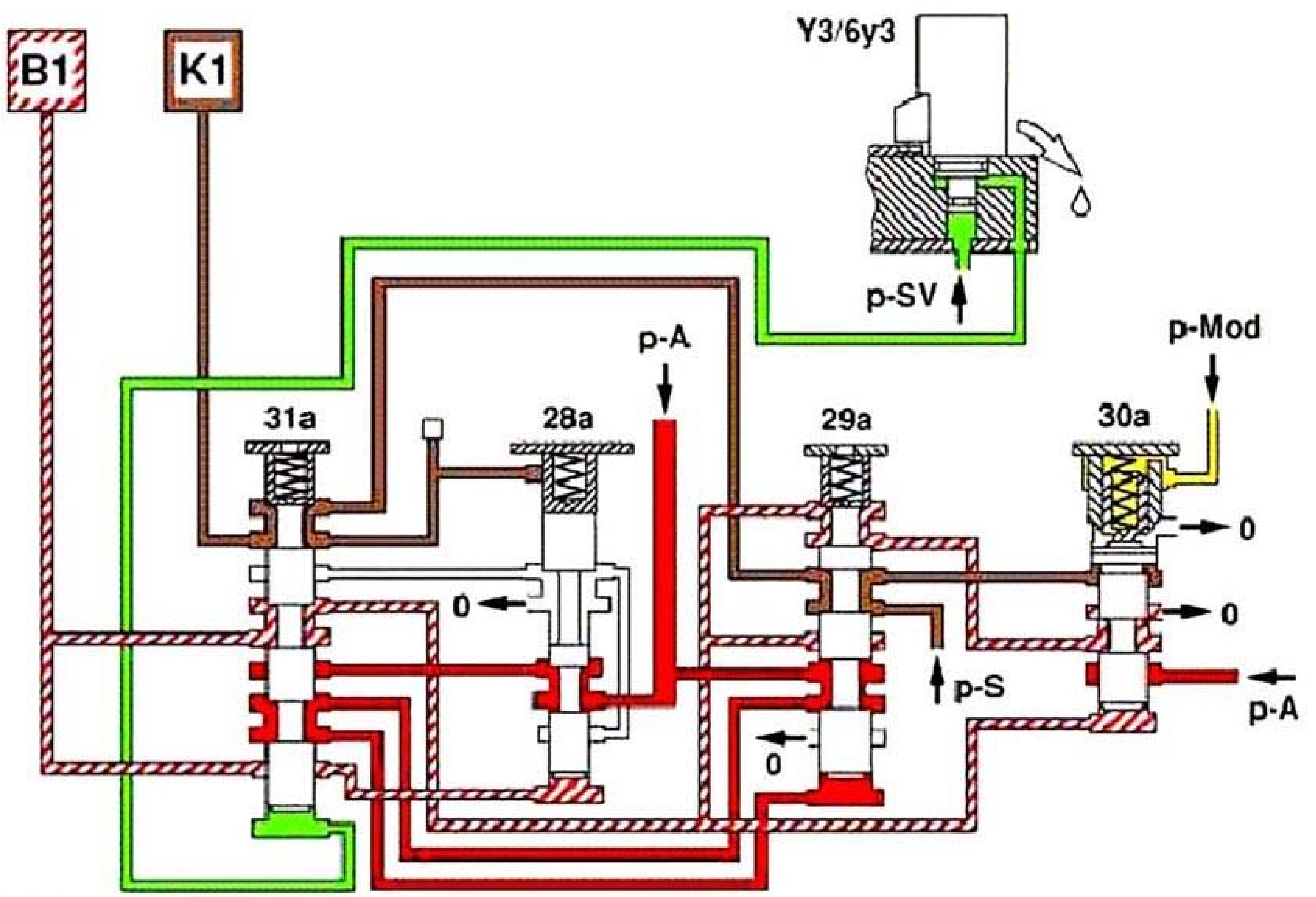
Shift From 1st To 2nd, Function



1 st gear engaged

0	Oil sump drain	K1	Front multiple-disc clutch
28a	1-2/4-5 holding pressure shift valve	p-A	Working pressure
29a	1-2/4-5 shift pressure shift valve	p-Mod	Modulating pressure
30a	Overlap regulating valve 1-2/4-5	p-S	Shift pressure
31a	1-2 / 4-5 command valve	p-SV	Shift valve pressure
B1	Front multiple-disc brake	Y3/6y3	1-2 and 4-5 shift solenoid valve

Fig. 133: Shift From 1st To 2nd, Function (1st Gear Engaged)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

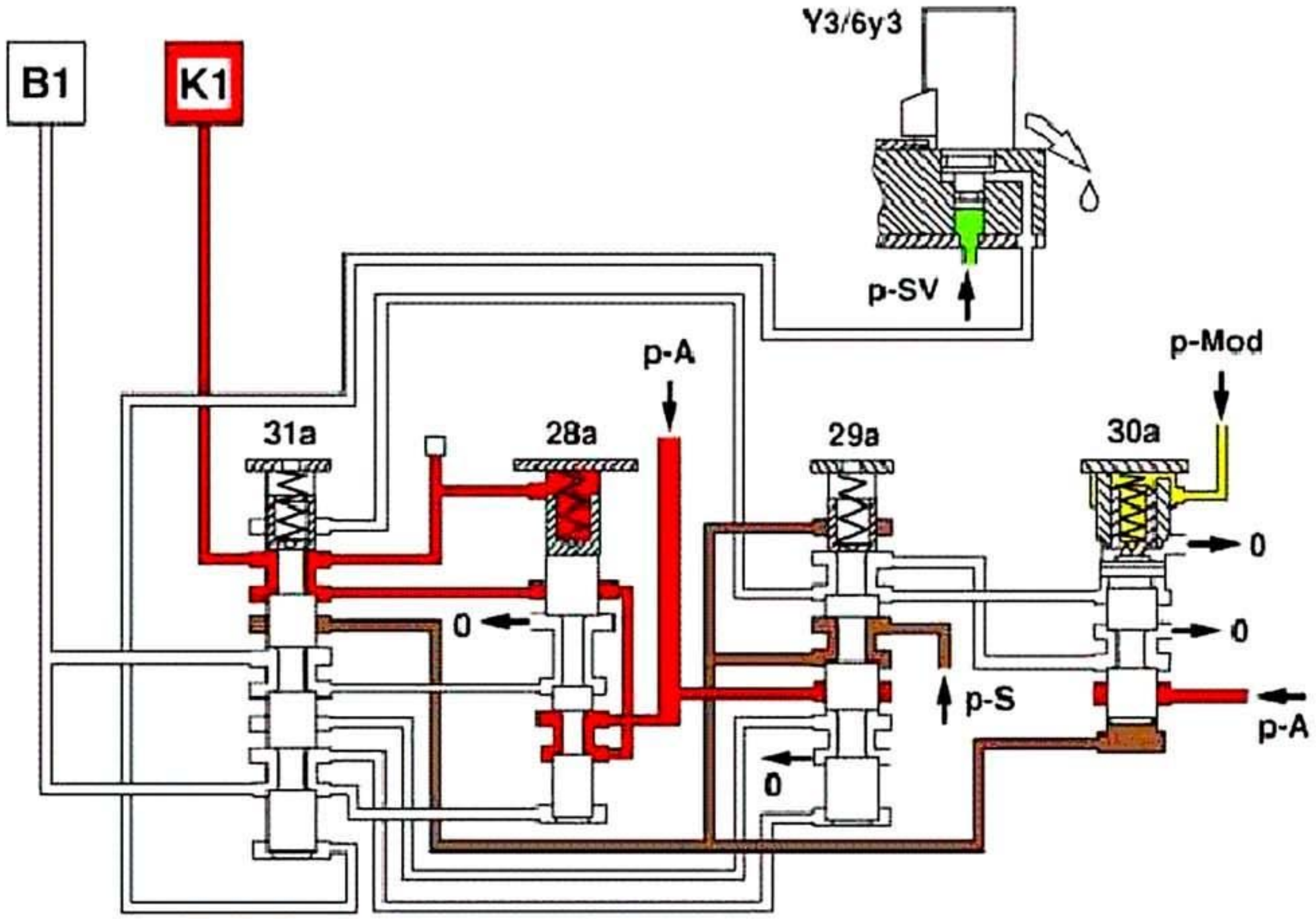


Shift phase

0	Oil sump drain	B1	Front multiple-disc brake
28a	1-2/4-5 holding pressure shift valve	K1	Front multiple-disc clutch
29a	1-2/4-5 shift pressure shift valve	p-A	Working pressure
30a	Overlap regulating valve 1-2/4-5	p-Mod	Modulating pressure
31a	1-2 / 4-5 command valve	p-S	Shift pressure
		p-SV	Shift valve pressure
		Y3/6y3	1-2 and 4-5 shift solenoid valve

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Fig. 134: Shift From 1st To 2nd, Function (Shift Phase)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



2nd gear engaged

0	Oil sump drain	K1	Front multiple-disc clutch
28a	1-2/4-5 holding pressure shift valve	p-A	Working pressure
29a	1-2/4-5 shift pressure shift valve	p-Mod	Modulating pressure
30a	Overlap regulating valve 1-2/4-5	p-S	Shift pressure
31a	1-2 / 4-5 command valve	p-SV	Shift valve pressure
B1	Front multiple-disc brake	Y3/6y3	1-2 and 4-5 shift solenoid valve

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Fig. 135: Shift From 1st To 2nd, Function (Second Gear Engaged)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Aim

Engage front multiple-disc clutch (K1), disengage front multiple-disc brake (B1).

Operation

1st Gear Engaged

The end face of the 1-2/4-5 command valve (31a) is kept depressurized via the 1-2 and 4-5 shift solenoid valve (Y3/6y3). Via the 1-2/4-5 holding pressure shift valve (28a), working pressure (p-A) is applied to the front multiple-disc clutch (K1) is depressurized. See **Fig. 133**.

Shift Phase

Via the 1-2 and 4-5 shift solenoid valve (Y3/6y3), the shift valve pressure (p-SV) is directed onto the end face of the command valve 1-2/4-5 (31a). See **Fig. 134**. The 1-2/4-5 command valve (31a) is displaced and the shift pressure (p-S) coming from the 1-2/4-5 shift pressure shift valve (29a) via the 1-2/4-5 command valve (31a) is directed to the front multiple-disc clutch (K1). At the same time the front multiple-disc brake (B1) is subjected to overlap pressure from the 1-2/4-5 overlap regulating valve (30a).

The B1 pressure acting on the end face of the 1-2/4-5 shift pressure shift valve (29a) is superseded by the working pressure (p-A). The increasing shift pressure (p-S) at the front multiple-disc clutch (K1) acts on the annular area of the 1-2/4-5 overlap regulating valve (30a). With an appropriate pressure level at the 1-2/4-5 holding pressure shift valve (28a) this valve switches over.

2nd Gear Engaged

After the gear change is complete, the pressure on the end face of the 12-/4-5 command valve (31a) is reduced via the 1-2 and 4-5 shift solenoid valve (Y3/6y3) and the command value is pushed back into its original position. See **Fig. 135**. Via the 1-2/4-5 holding pressure shift valve (28a) working pressure (p-A) now reaches the front multiple-disc clutch (K1) via the 1-2/4-5 command valve (31a).

The front multiple-disc brake (B1) is disengaged (depressurized). The spring in the 1-2/4-5 shift pressure shift valve (29a) pushes this into its original position.

Operating Pressure, Function

See **OPERATING PRESSURE, FUNCTION**.

Shift Pressure, Function

See **SHIFT PRESSURE, FUNCTION**.

Modulating Pressure, Function

See **MODULATING PRESSURE, FUNCTION**.

Shift Valve Pressure, Function

See **SHIFT VALVE PRESSURE, FUNCTION**.

Lubricating Pressure, Function

See **LUBRICATING PRESSURE, FUNCTION**.

Regulating Valve Pressure, Function

See **REGULATING VALVE PRESSURE, FUNCTION**.

Limp-Home Mode, Function

Operation

In order to ensure a safe driving state and to prevent damage to the automatic transmission, the ECT control module (N15/3) switches to limp-home mode in the event of critical faults. A fault code assigned to the fault is stored in memory.

All solenoid and regulating valves are thus de-energized.

Effect

- The gear last engaged remains engaged.
- The modulating pressure and shift pressure rise to the maximum levels.
- The torque converter lockup clutch is switched off.

In order to preserve the operability of the vehicle to some extent, the hydraulic control can be used to engage 2nd gear or reverse:

- Stop Vehicle
- Switch Off Engine
- Move Selector Lever To "P"
- Wait At Least 10 Seconds
- Start Engine
- Move Selector Lever To "D": 2Nd Gear
- Move Selector Lever To "R"

The limp-home function remains active until the fault is rectified or the stored fault code is erased. Sporadic faults can be reset via ignition OFF/ON.

Upshift/Downshift Solenoid Valve, Location/Design/Task/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of PWM Solenoid Valve, Torque Converter Lockup Clutch

See **LOCATION/TASK/DESIGN/FUNCTION OF PWM SOLENOID VALVE, TORQUE CONVERTER LOCKUP CLUTCH**.

Modulating Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **MODULATING PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Operating Pressure, Function

The working pressure supplies pressure to the hydraulic control and transmission elements. The working pressure is the highest hydraulic pressure in the entire hydraulic system. The working pressure is regulated at the working pressure regulating valve in relation to the load and gear. All other pressures required for transmission control are diverted from the working pressure.

Working Pressure Regulating Valve, Location/Task/Function

See **WORKING PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Pressure Control Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiplate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Task/Design/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Task/Function

See **SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Task/Function

See **OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Location/Task/Function Of Command Valve

See **LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Selector Valve, Location/Task

See **SELECTOR VALVE, LOCATION/TASK**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Lubricating Pressure, Function

Operation

The working pressure regulating valve diverts surplus oil to the lubrication pressure regulating valve, from where it is controlled and used for lubricating and cooling the mechanical transmission and torque converter. In addition the pressure in the torque converter is limited via the lubrication pressure.

Working Pressure Regulating Valve, Location/Task/Function

See **WORKING PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Lubrication Pressure Regulating Valve, Location/Task/Function

See **LUBRICATION PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Torque Converter Lockup Clutch Regulating Valve, Location/Task/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Pressure Control Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiplate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Task/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Task/Function

See **SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Task/Function

See **OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Location/Task/Function Of Command Valve

See E**LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Selector Valve, Location/Task

See **SELECTOR VALVE, LOCATION/TASK**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Shift Pressure, Function

Operation

The shift pressure is determined by the shift pressure regulating solenoid valve (Y3/6y2) and the shift pressure regulating valve.

The shift pressure:

- Regulates the pressure in the activating shift element during the shift phase.
- Determines together with the modulating pressure the pressure reduction at the deactivating shift element

as regulated by the overlap regulating valve.

- Initializes 2nd gear in limp-home mode.

Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Pressure Regulating Valve, Location/Task/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Task/Function

See **OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Modulating Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **MODULATING PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of PWM Solenoid Valve, Torque Converter Lockup Clutch

See **LOCATION/TASK/DESIGN/FUNCTION OF PWM SOLENOID VALVE, TORQUE CONVERTER LOCKUP CLUTCH**.

Multiple-Disc Brake, Location/Task/Design/Function

See N**MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiplate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Design/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Design/Function

See **SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Command Valve, Location/Design/Function

See **LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Selector Valve, Location/Task

See **SELECTOR VALVE, LOCATION/TASK**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Modulating Pressure, Function

Operation

The modulating pressure influences the size of the working pressure and determines together with the shift pressure the pressure regulated at the overlap regulating valve.

The modulating pressure is regulated at the modulating pressure regulating solenoid (Y3/6y1), which is under regulating valve pressure. The modulating pressure via variable and relative to the engine load.

Modulating Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **MODULATING PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Working Pressure Regulating Valve, Location/Task/Function

See **WORKING PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Task/Function

See N**OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**

Shift Pressure Control Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of PWM Solenoid Valve, Torque Converter Lockup Clutch

See **LOCATION/TASK/DESIGN/FUNCTION OF PWM SOLENOID VALVE, TORQUE CONVERTER LOCKUP CLUTCH**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiplate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Design/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Design/Function

See **SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Command Valve, Location/Design/Function

See **LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Selector Valve, Location/Task

See **SELECTOR VALVE, LOCATION/TASK**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Regulating Valve Pressure Regulating Valve, Location/Task/Function

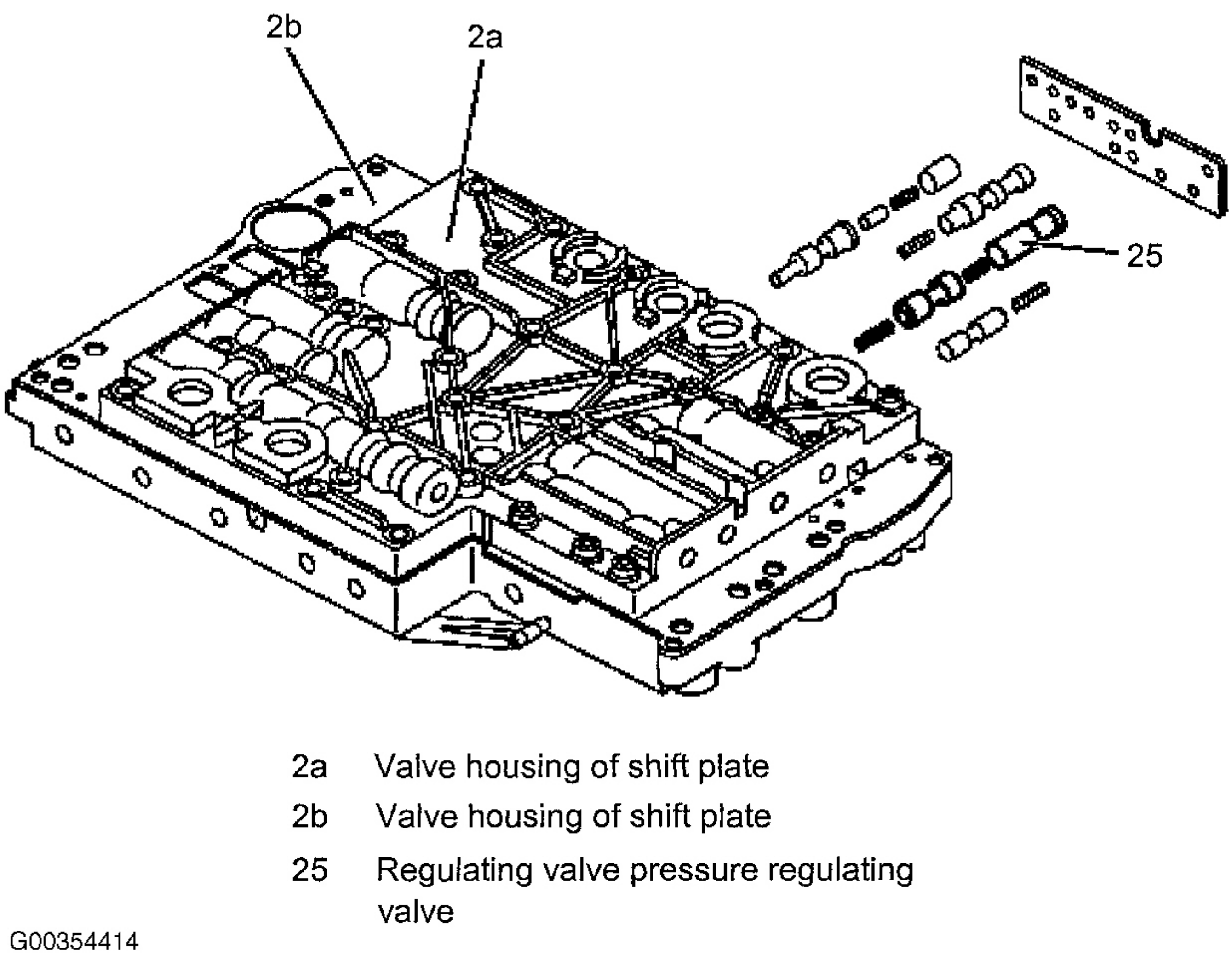


Fig. 136: Regulating Valve Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Regulating Valve Pressure Regulating Valve, Location

In the valve housing of shift plate (2b). See **Fig. 136**.

Regulating Valve Pressure Regulating Valve, Task

Controls the regulating valve pressures.

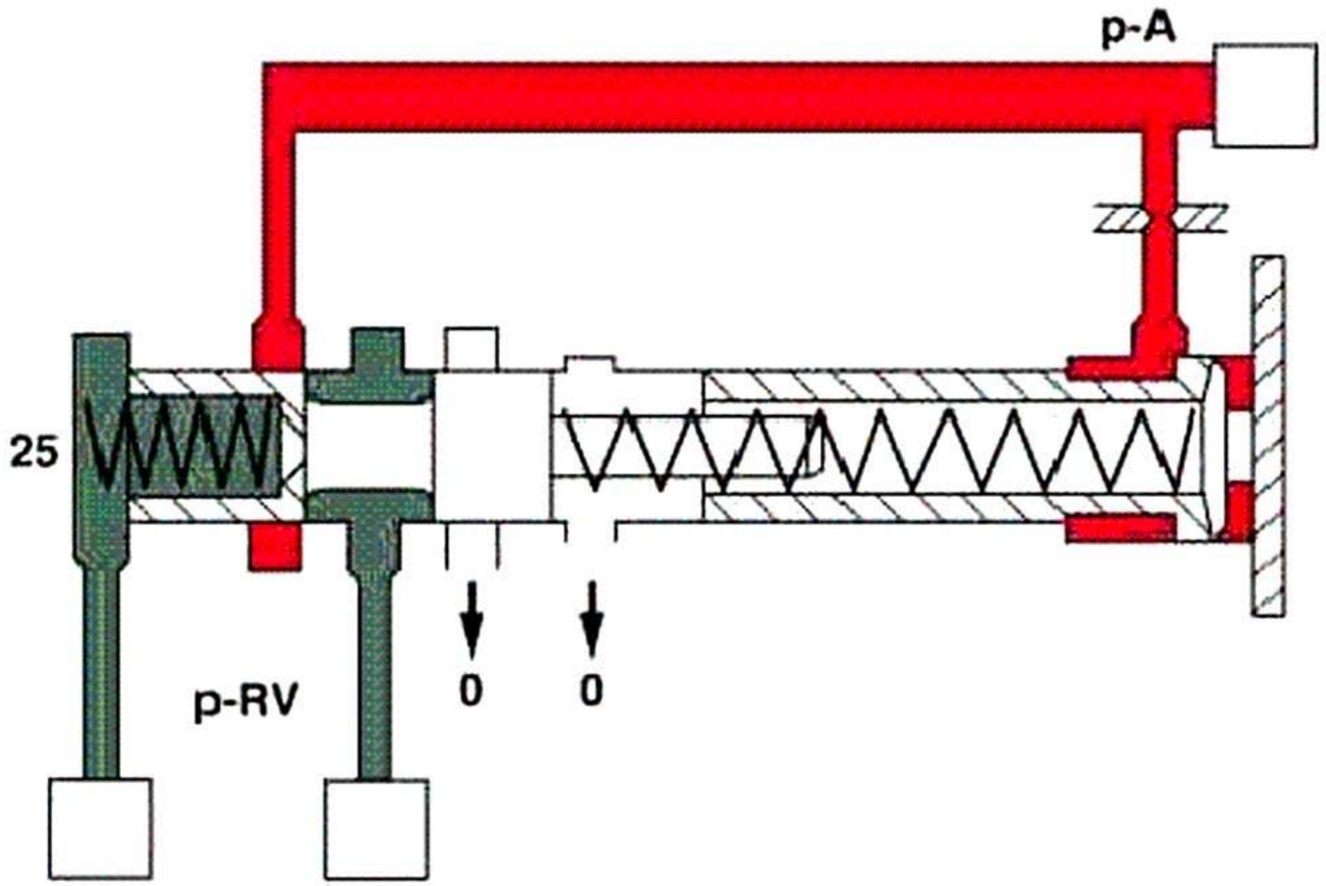
Regulating Valve Pressure Regulating Valve, Function

See **REGULATING VALVE PRESSURE REGULATING VALVE, FUNCTION**.

Regulating Valve Pressure Regulating Valve, Function

Operation

The regulating valve pressure (p-RV) is controlled up to the maximum pressure at the regulating valve pressure regulating valve (25) depending on the working pressure (p-A).



0	Oil sump drain
25	Regulating valve pressure regulating valve
p-A	Working pressure
p-RV	Regulating valve pressure

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Fig. 137: Regulating Valve Pressure Regulating Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Regulating Valve Pressure, Function

Operation

The regulating valve pressure is regulated at the regulating valve pressure regulating valve depending on the working pressure up to a maximum pressure of 8 bar. It supplies the modulating pressure regulating solenoid valve (Y3/6y1), the shift pressure regulating solenoid valve (Y3/6y2) and the shift valve pressure regulating valve.

Regulating Pressure Valve Pressure Regulating Valve, Location/Task/Function

See **REGULATING VALVE PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Modulating Pressure Regulating Solenoid Valve, Location/Task Design/Function

See **MODULATING PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Valve Pressure Regulating Valve, Location/Task/Function

See **SHIFT VALVE PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiplate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Task/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Task/Function

See **SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Task/Function

See **OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Location/Task/Function Of Command Valve

See **LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Selector Valve, Location/Task

See **SELECTOR VALVE, LOCATION/TASK**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Shift Valve Pressure, Function

Operation

The shift valve pressure is derived from the regulating valve pressure, regulated at the shift valve pressure regulating valve and is then present:

- 1-2 And 4-5 Shift Solenoid Valve (Y3/6Y3)
- 3-4 Shift Solenoid Valve (Y3/6Y4)
- 2-3 Shift Solenoid Valve (Y3/6Y5)
- Torque Converter Lockup PWM Solenoid Valve (Y3/6Y6)
- 3-4 And 2-3 Shift Pressure Valve Shift Valve

The shift valve pressure controls the command valves via the upshift/downshift solenoid valves.

Upshift/Downshift Solenoid Valve, Location/Task/Design/Function

See **UPSHIFT/DOWNSHIFT SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of PWM Solenoid Valve, Torque Converter Lockup Clutch

See **LOCATION/TASK/DESIGN/FUNCTION OF PWM SOLENOID VALVE, TORQUE CONVERTER LOCKUP CLUTCH**.

Shift Pressure Regulating Valve, Location/Task/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Shift Valve, Location/Design/Function

See **SHIFT PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Shift Valve Pressure Regulating Valve, Location/Task/Function

See **SHIFT VALVE PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Shift Pressure Regulating Solenoid Valve, Location/Task/Design/Function

See **SHIFT PRESSURE REGULATING SOLENOID VALVE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiple-Disc Brake, Location/Task/Design/Function

See **MULTIPLE-DISC BRAKE, LOCATION/TASK/DESIGN/FUNCTION**.

Multiplate Clutch, Location/Task/Design/Function

See **MULTI-PLATE CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Holding Pressure Shift Valve, Location/Design/Function

See **HOLDING PRESSURE SHIFT VALVE, LOCATION/TASK/FUNCTION**.

Overlap Regulating Valve, Location/Design/Function

See **OVERLAP REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Location/Task/Function Of Command Valve

See **LOCATION/TASK/FUNCTION OF COMMAND VALVE**.

Selector Valve, Location/Task

See **SELECTOR VALVE, LOCATION/TASK**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Overlap Regulating Valve, Location/Task/Function

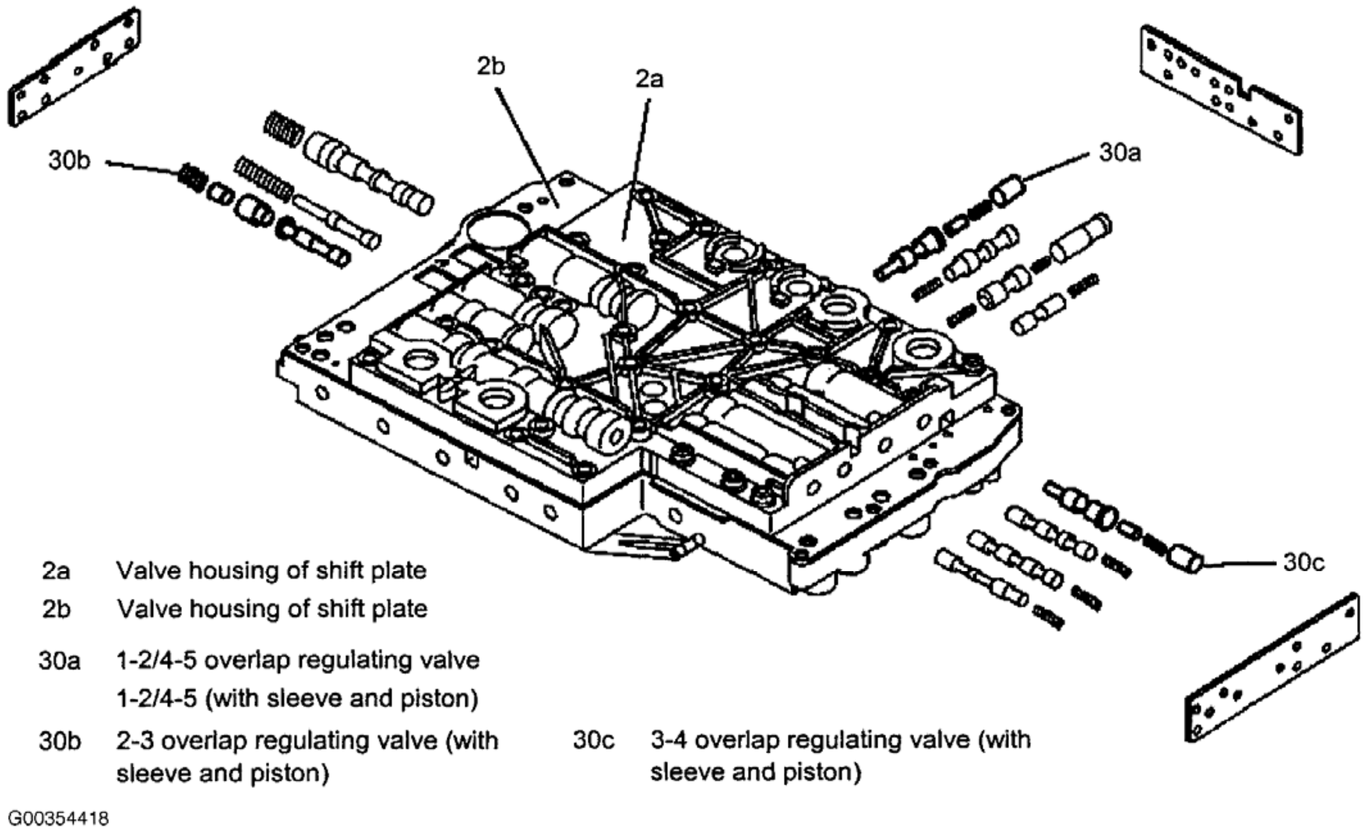


Fig. 138: Overlap Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Overlap Regulating Valve, Location

Each shift group is assigned one overlap regulating valve. The 1-2/4-5 overlap regulating valve (30a) is installed in the valve housing of the shift plate (2b), the 2-3 overlap regulating valve (30b) and 4-5 (30c) are installed in the valve housing of the shift plate (2a). See **Fig. 138**.

Overlap Regulating Valve, Location

The overlap regulating valve regulates the pressure reduction during a shift phase.

Overlap Regulating Valve, Function

See **OVERLAP REGULATING VALVE, FUNCTION**.

Shift Pressure Shift Valve, Location/Task/Function

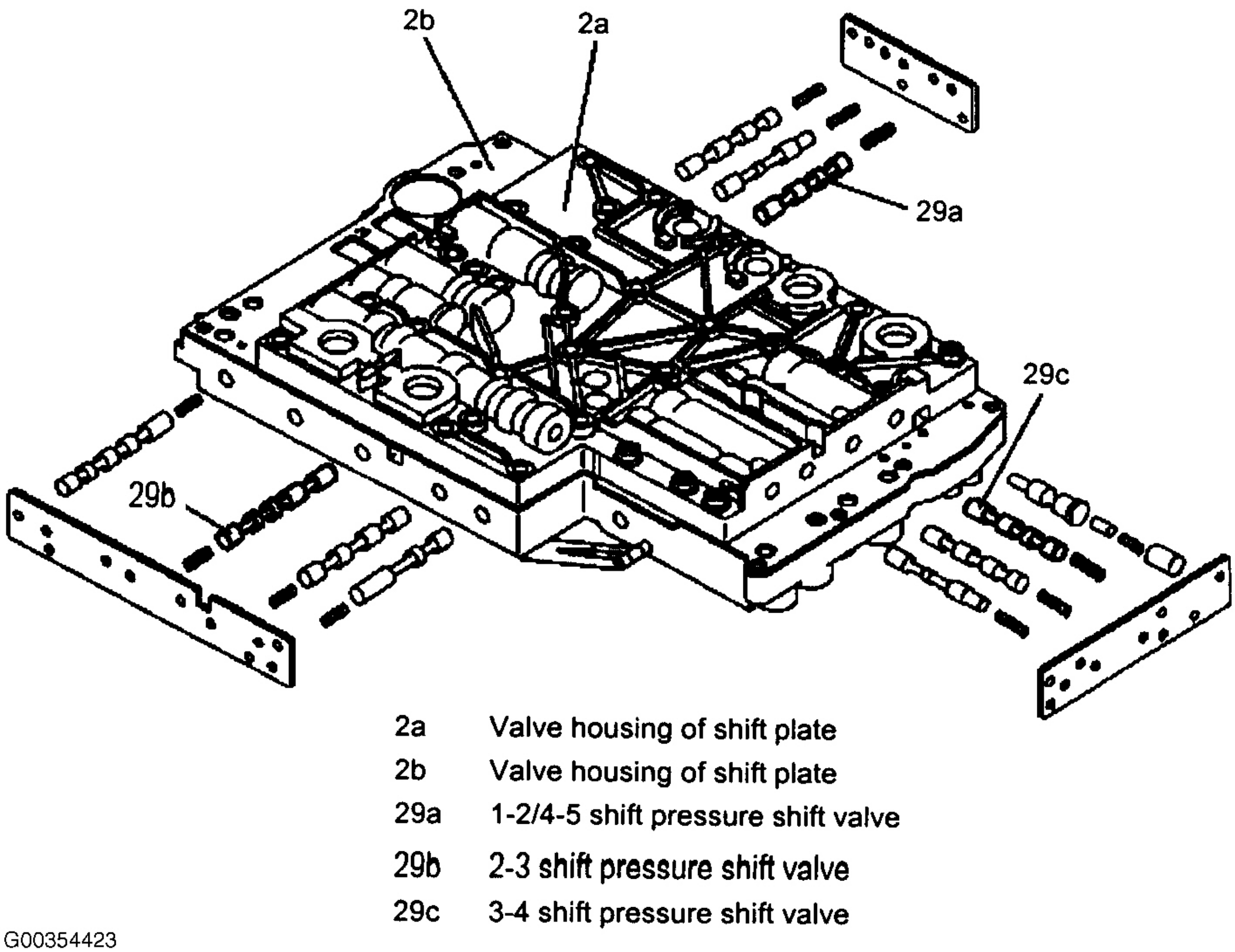


Fig. 139: Shift Pressure Shift Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Pressure Shift Valve, Location

Each shift group possesses one shift pressure shift valve. The 1-2/4-5 shift pressure shift valves (29a) and 2-3 shift pressure shift valve (29b) are installed in the valve housing of the shift plate (2b), the 3-4 shift pressure shift valve (29c) is installed in the valve housing of the shift plate (2a). See **Fig. 139**.

Shift Pressure Shift Valve, Task

To assign shift pressure to the engaging shift actuator and to assign the overlap pressure, controlled by the overlap regulating valve, to the disengaging shift actuator.

Shift Pressure Shift Valve, Function

See **SHIFT PRESSURE SHIFT VALVE, FUNCTION**.

Shift Pressure Shift Valve, Function

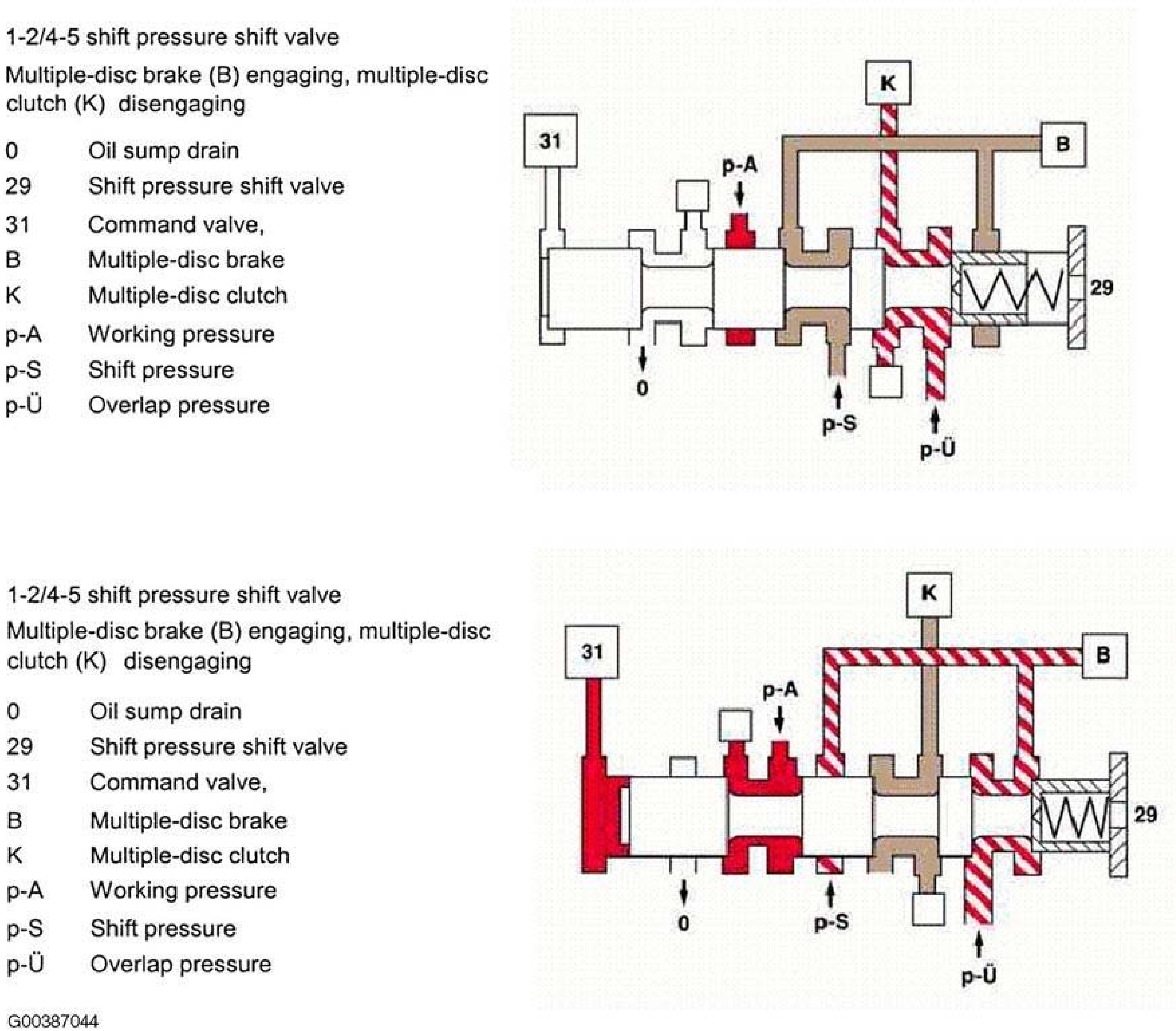


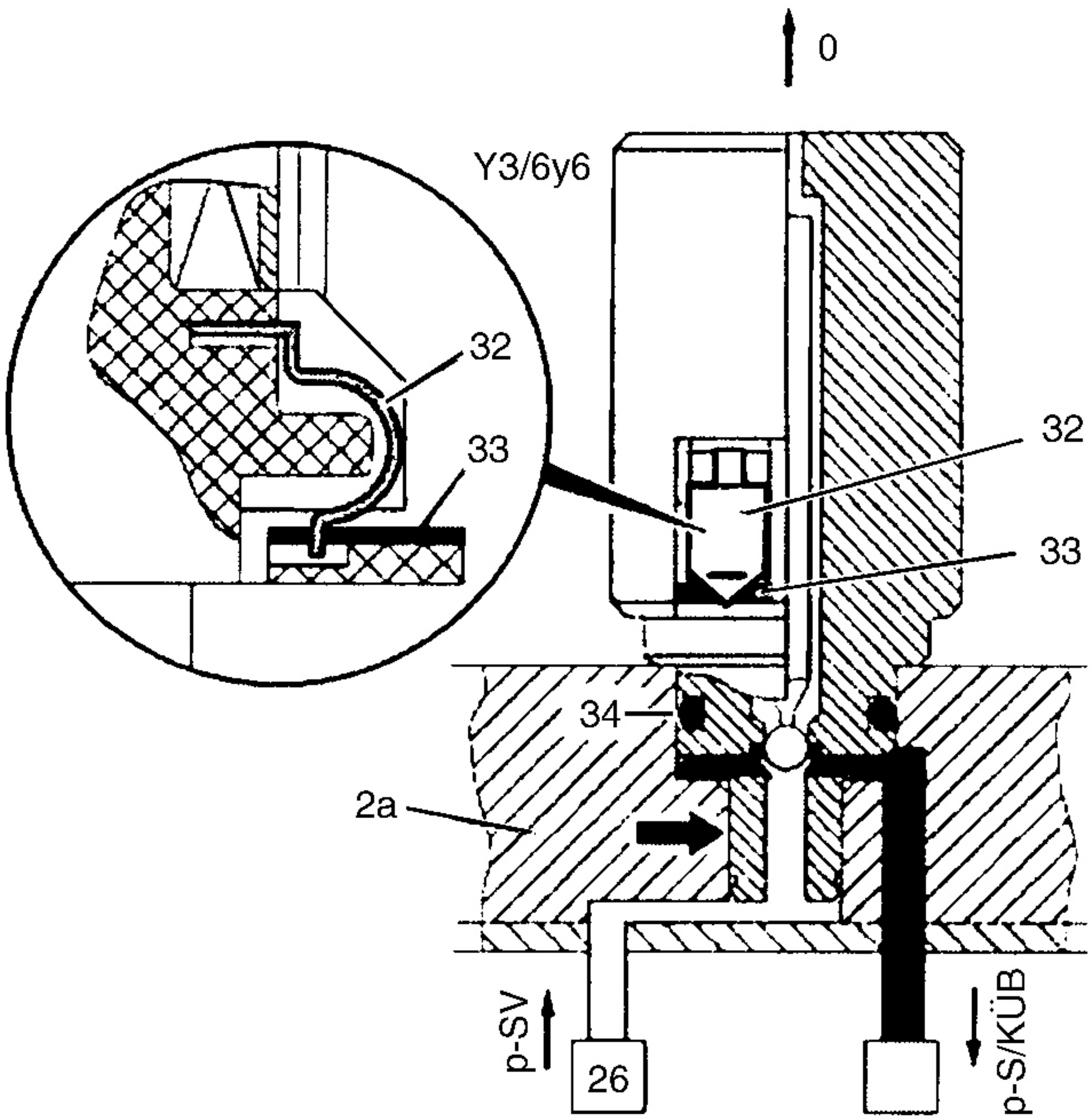
Fig. 140: Shift Pressure Shift Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

When the multiple-disc brake (B) is engaged, the working pressure (p-A) is applied to the end face of the shift valve (29) via the command valve (31). See **Fig. 140**. Its shift condition is retained in the shift phase, whilst the shift element pressure acting on the end face and which is variable during the shift phase is replaced by a corresponding, constant pressure.

When the multiple-disc clutch (K) is engaged (K) the end face of the shift pressure shift valve (29) is depressurized during the stationary and shift phases, here the shift condition is also retained during the shift phase.

Torque Converter Lockup Clutch PWM Solenoid Valve, Design



0	Oil sump drain	p-S/KÜB	KÜB control pressure
2a	Valve housing of shift plate	p-SV	Shift valve pressure
26	Shift valve pressure	Y3/6y6	Torque converter lockup PWM solenoid

Fig. 141: Torque Converter Lockup Clutch PWM Solenoid Valve
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Structure

The torque converter lockup PWM solenoid valve (Y3/6y6) is sealed off to the valve body of the shift plate (2a) by an O-ring (34) and a seal (arrow). See **Fig. 141**. The contact springs (32) on the PWM converter lockup solenoid valve (Y3/6y6) engage in a slot in the conductor tracks (33). The force of the contact spring (32) ensures safe contacts.

Manual Drive Mode Selection, Function (Without Touch Shift)

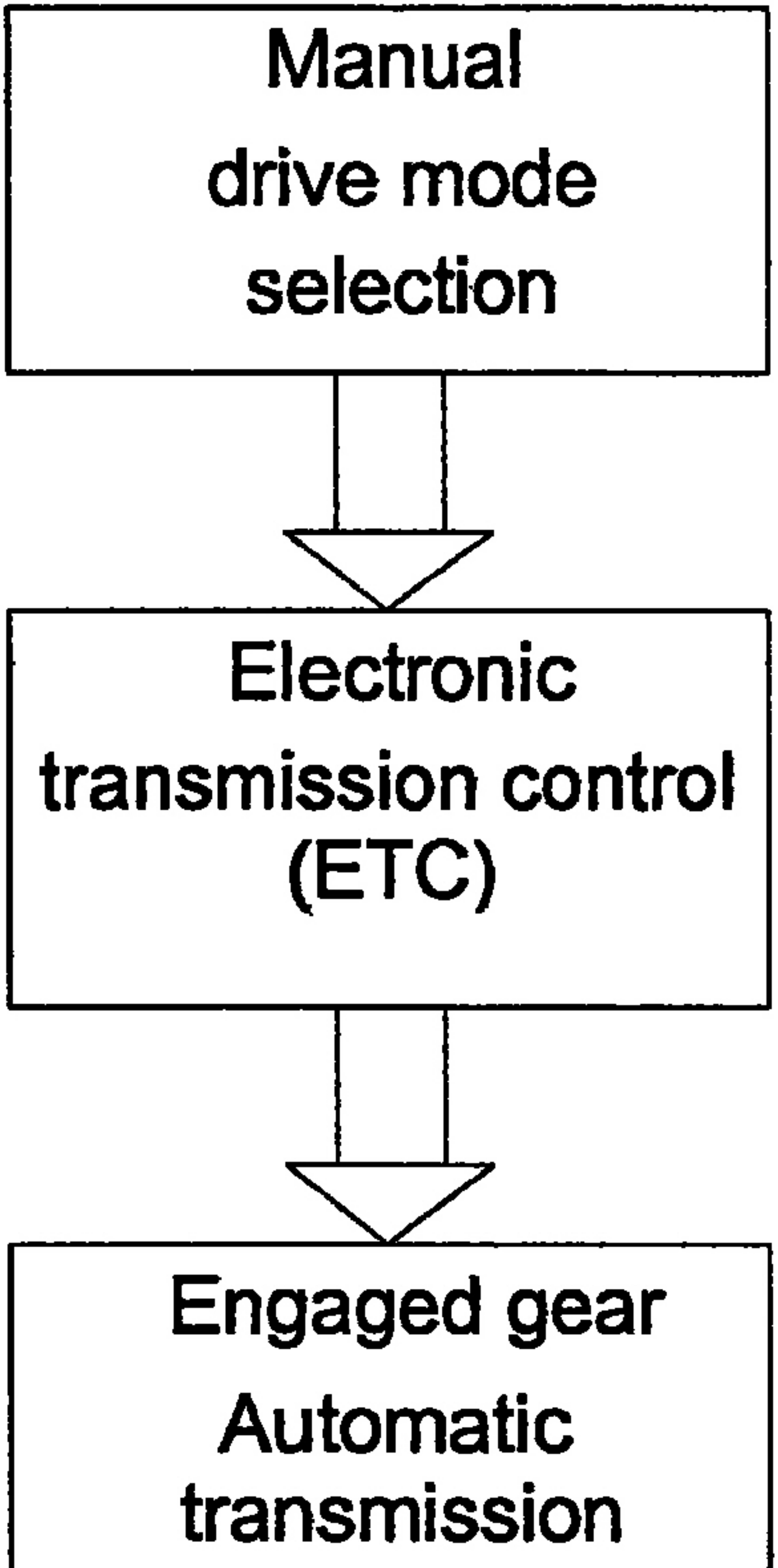

Manual
drive mode
selection
Electronic
transmission control
(ETC)
Engaged gear
Automatic
transmission

Fig. 142: Manual Drive Mode Selection, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

With the selector lever on the floor shift it is possible to adapt the automatic gearshift sequence to suit specific operating conditions. Although the selector lever position can be changed the forward gears while driving, the electronic transmission control (ETC) prevents over-revving of the engine. See **Fig. 142**.

Floor Shift, Location/Task/Design/Function

See .

Reverse Lamp Switch, Location/Task/Function

See **REVERSE LAMP SWITCH, LOCATION/TASK/FUNCTION**.

Shift Detent Mechanism, Location/Task/Design/Function

See **SHIFT DETENT MECHANISM, LOCATION/TASK/DESIGN/FUNCTION (WITHOUT TOUCH SHIFT)**.

D-4 Shift Isolating Mechanism, Location/Task/Design/Function

See **D-4 SHIFT ISOLATING MECHANISM, LOCATION/TASK/DESIGN/FUNCTION**.

Location/Task/Design/Function Of R/P Lock

See **LOCATION/TASK/DESIGN/FUNCTION OF R/P LOCK (WITHOUT TOUCH SHIFT)**.

Position Sensor, Location/Task/Function

See **POSITION SENSOR, LOCATION/TASK/FUNCTION**.

Transmission Range Recognition Switch, Location/Task/Design/Function

See **TRANSMISSION RANGE RECOGNITION SWITCH, LOCATION/TASK/DESIGN/FUNCTION**.

ETC Control Module, Location/Task

See **ETC CONTROL UNIT, LOCATION/TASK**.

Floor Shift, Location/Task/Design/Function

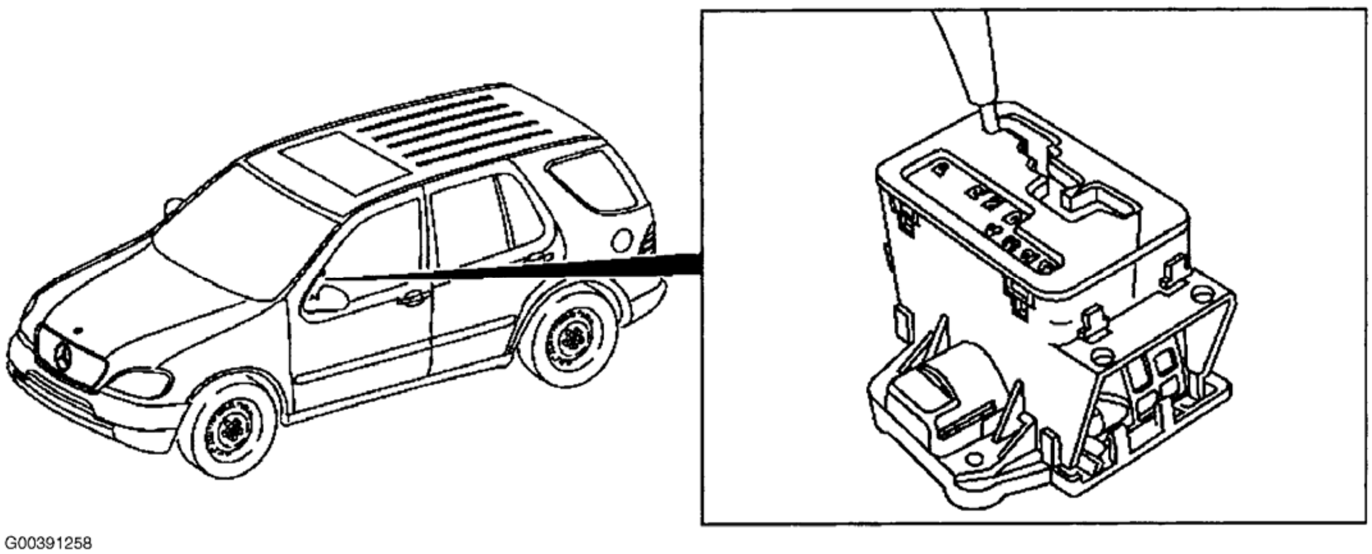


Fig. 143: Floor Shift (Without Touch Shift)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Floor Shift, Location

The floor shift is located in the center console of the vehicle. See **Fig. 143**.

Floor Shift, Task

The floor shift is the central control for the driver to influence the shift program of the automatic transmission.

Floor Shift, Design

See **FLOOR SHIFT, DESIGN**.

Floor Shift, Function

See **FLOOR SHIFT, FUNCTION**.

Floor Shift, Design

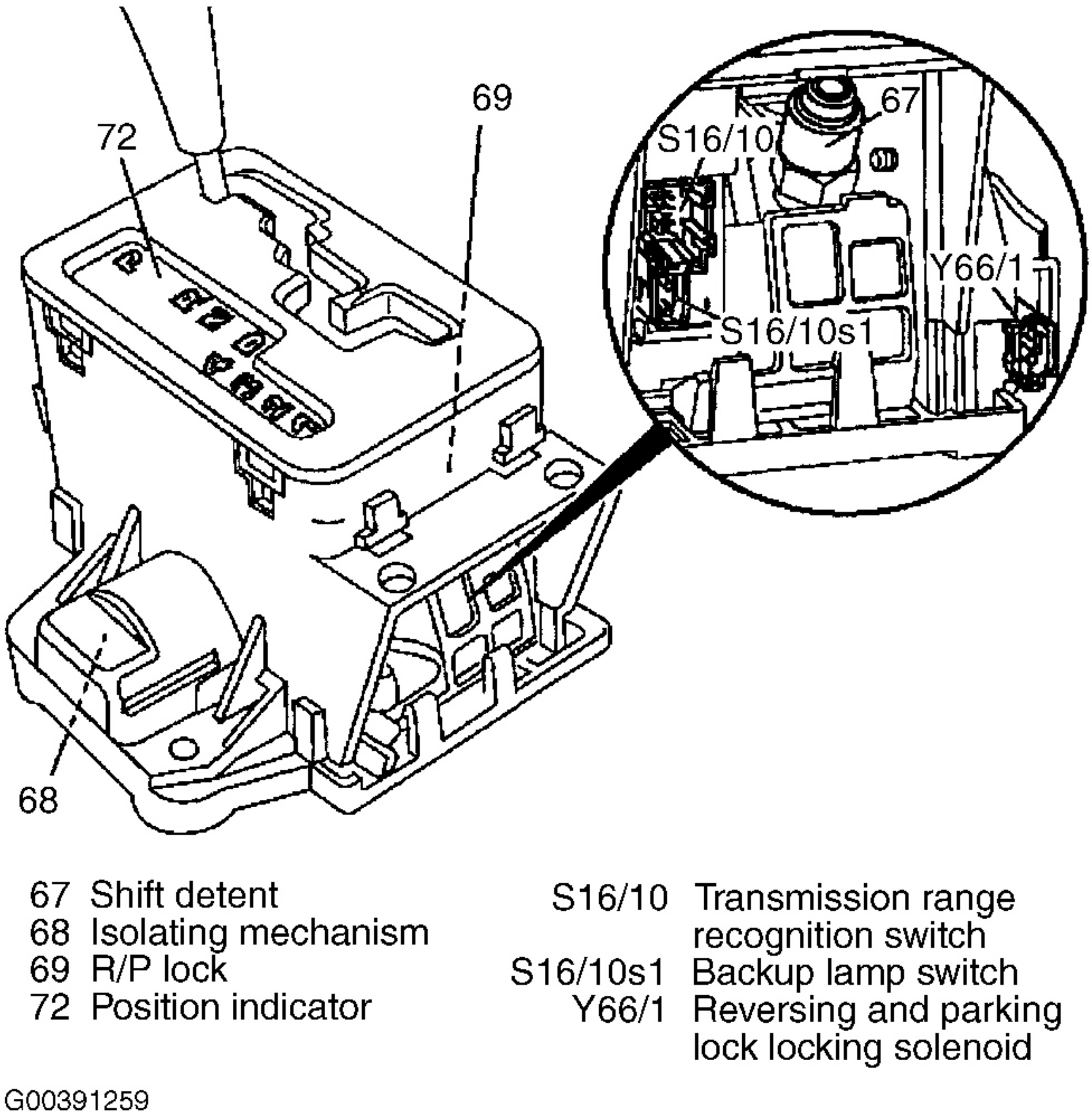


Fig. 144: Floor Shift, Design (Without Touch Shift)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Floor Shift, Function

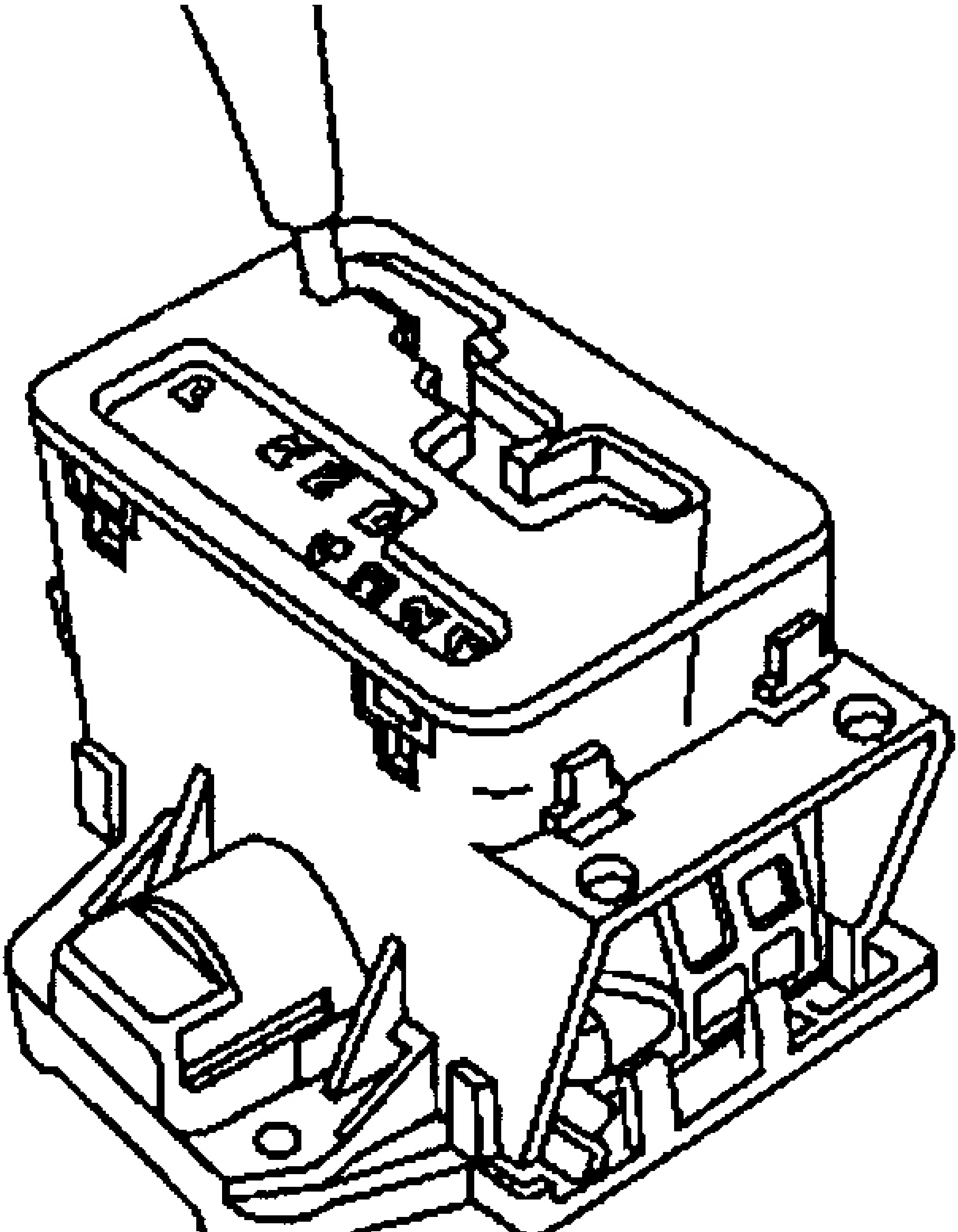


Fig. 145: Floor Shift, Function (Without Touch Shift)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The selector lever is guided and positioned in the shift gate. The selector lever positions "P', "R", "N" and "D" are transmitted mechanically to the transmission by means of the shift rod. In parallel, all selector lever positions are transmitted to the ETC control module (N15/3) by means of the transmission range recognition switch (S16/10) in the floor shift. If the selector lever is moved across from "D" to "4", the selector lever is isolated from the shift rod. Thus there is no longer any mechanical connection with the transmission. See **Fig. 145**. The selector lever positions "4", "3", "2" and "1" are then transmitted electronically to the ETC control module (N15/3) via the transmission range recognition switch (S16/10).

Manual Drive Mode Selection, Function (With Touch Shift)

Transmission with touch shift.

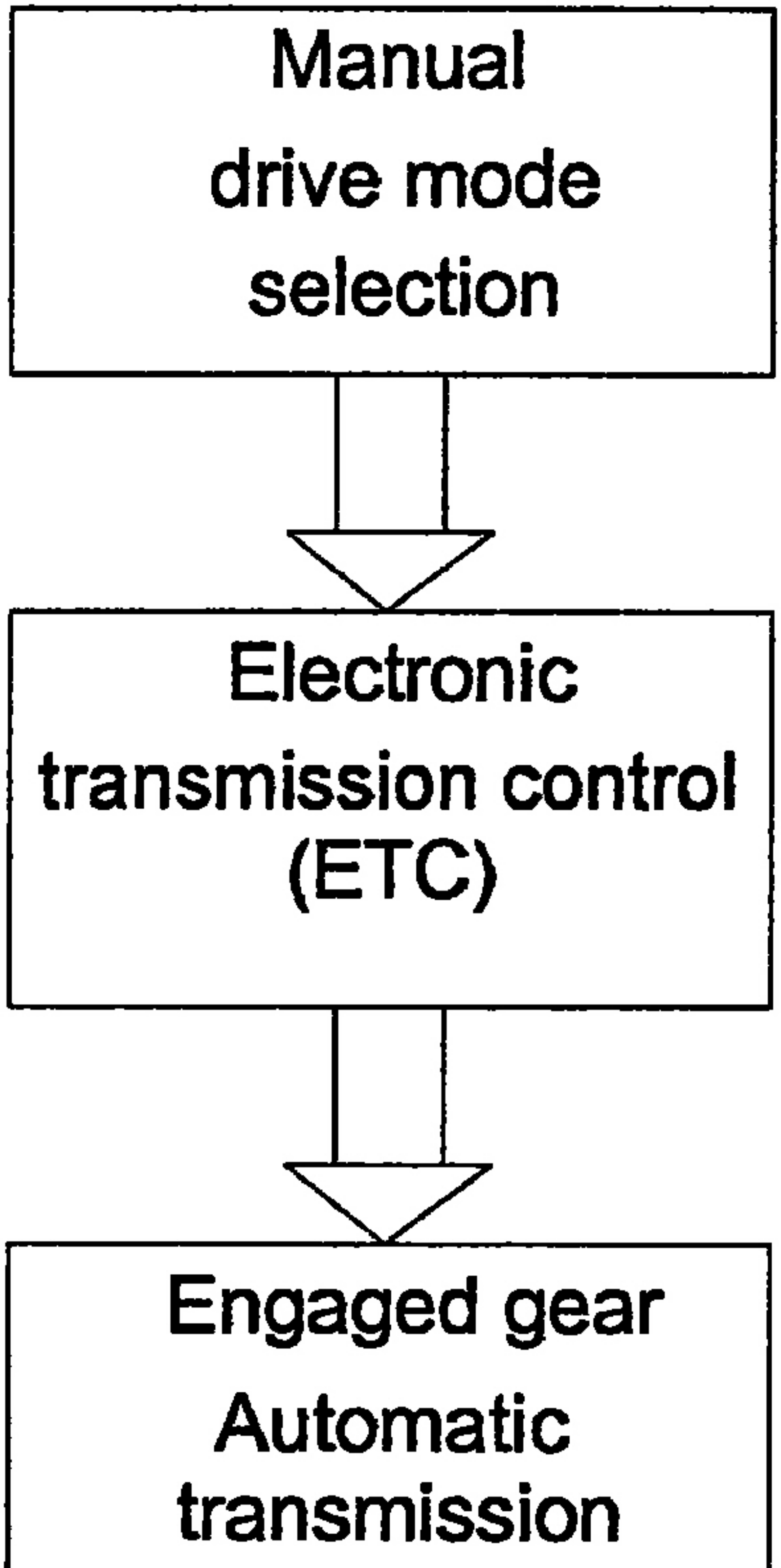

Manual
drive mode
selection
Electronic
transmission control
(ETC)
Engaged gear
Automatic
transmission

Fig. 146: Manual Drive Mode Selection, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

With the selector lever on the floor shift it is possible to adapt the automatic gearshift sequence to suit specific operating conditions. See **Fig. 146**. Although the selector lever position can be changed in the forward gears while driving, the electronic transmission control (ETC) prevents over-revving of the engine.

Floor Shift, Location/Task/Design/Function

See **FLOOR SHIFT, LOCATION/TASK/DESIGN/FUNCTION**.

Shift Detent Mechanism, Location/Task/Design/Function

See **SHIFT DETENT MECHANISM, LOCATION/TASK/DESIGN/FUNCTION**

Location/Task/Design/Function Of R/P Lock

See **LOCATION/TASK/DESIGN/FUNCTION OF R/P LOCK**.

Position Display, Location/Task

See **POSITION DISPLAY, LOCATION/TASK**.

ETC Control Module, Location/Task

See **ETC CONTROL UNIT, LOCATION/TASK**.

Control Module For Electronic Selector Lever Module, Location/Task/Design

See .

Floor Shift, Location/Task/Design/Function

TRANSMISSION with touch shift.

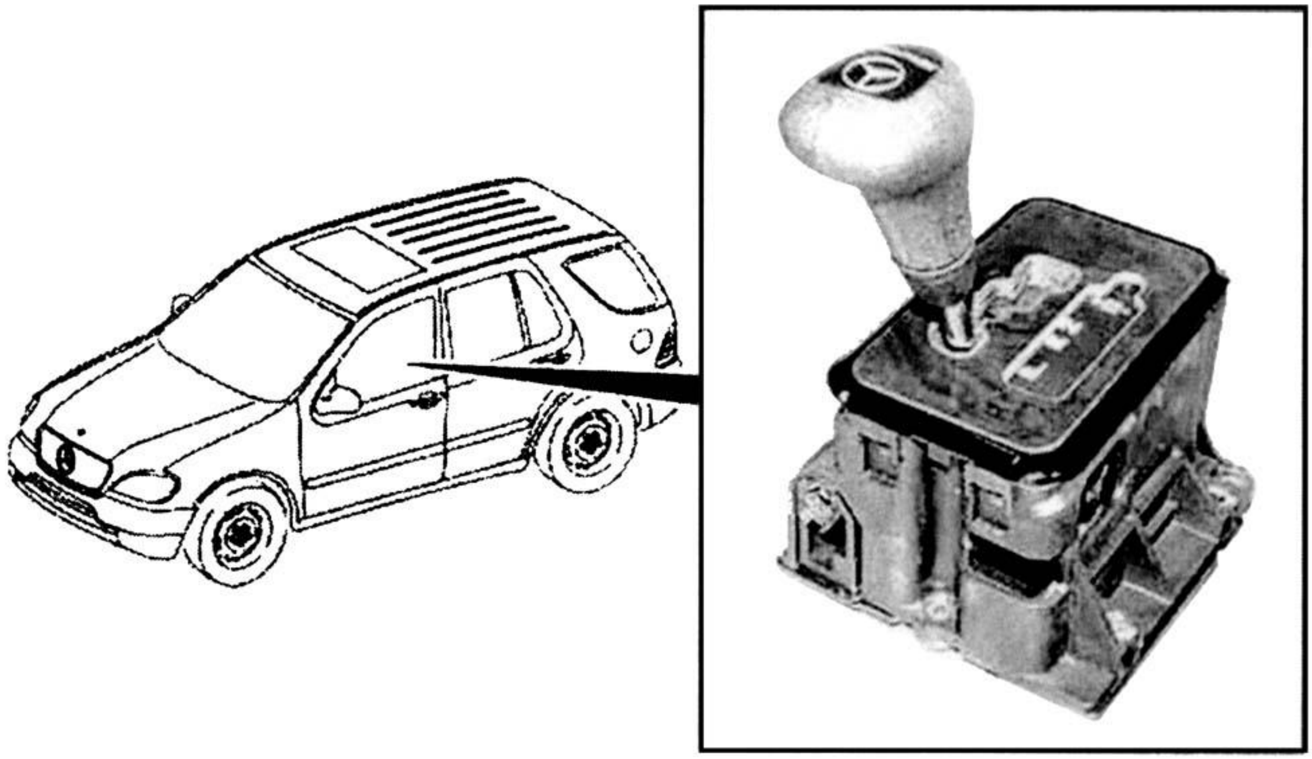


Fig. 147: Floor Shift (With Touch Shift)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Floor Shift, Location

The floor shift is located in the center console of the vehicle. See **Fig. 147**.

Floor Shift, Task

The floor shift is the central control for the driver to influence the shift program of the automatic transmission.

Floor Shift, Design

See **FLOOR SHIFT, DESIGN**.

Floor Shift, Function

See **FLOOR SHIFT, FUNCTION**.

Floor Shift, Design

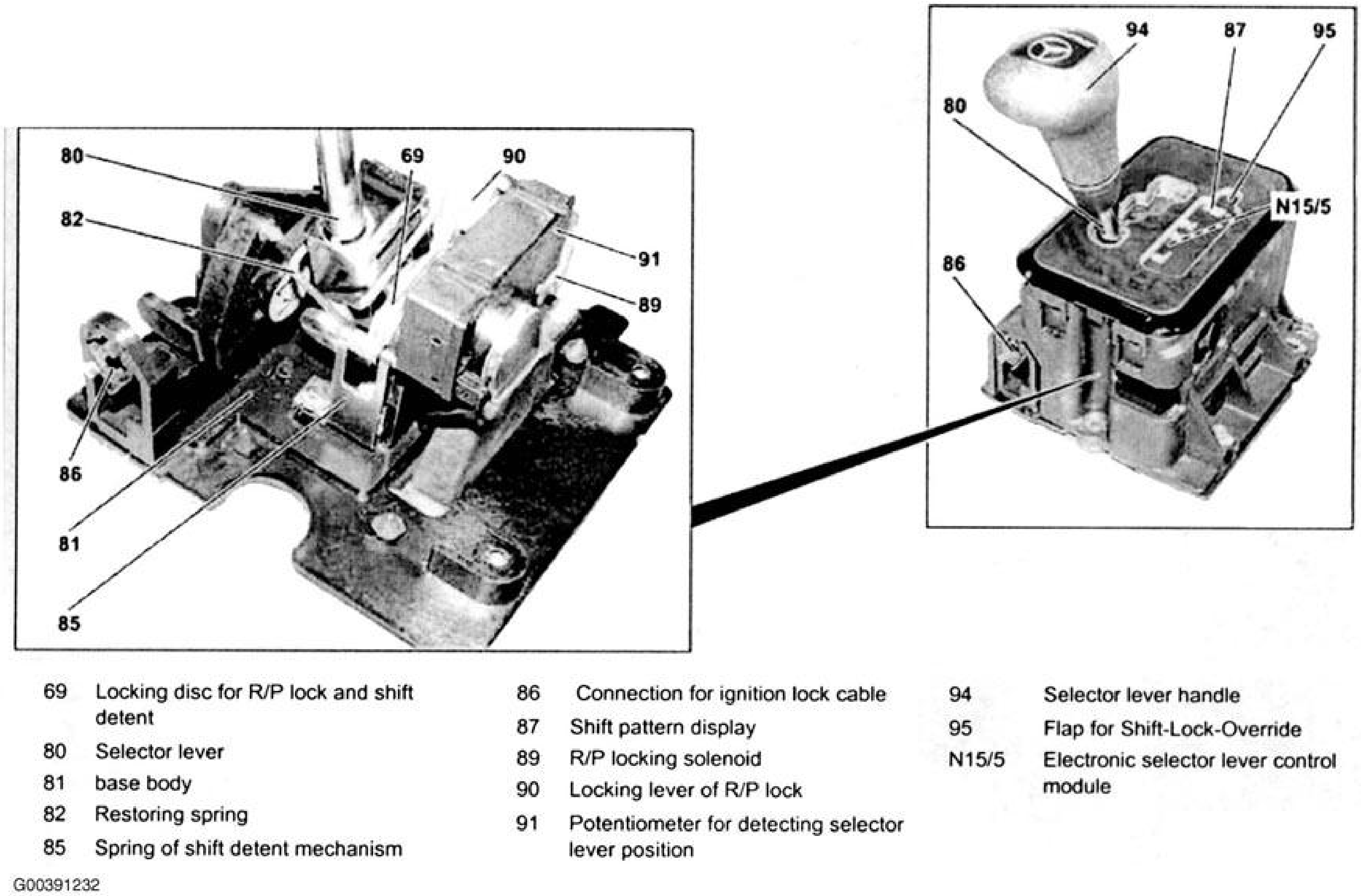


Fig. 148: Floor Shift, Design
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Floor Shift, Function

Operation

The selector lever is guided and positioned in the shift gate. All the selector lever positions are recognized by the electronic selector lever module control module (N15/5), coded and transmitted to the ETC control module via CAN. See **Fig. 149**. In parallel to sending via CAN the selector lever positions "P", "R", "N", and "D" are passed on mechanically to the range selector lever on the transmission side by means of a shift rod.

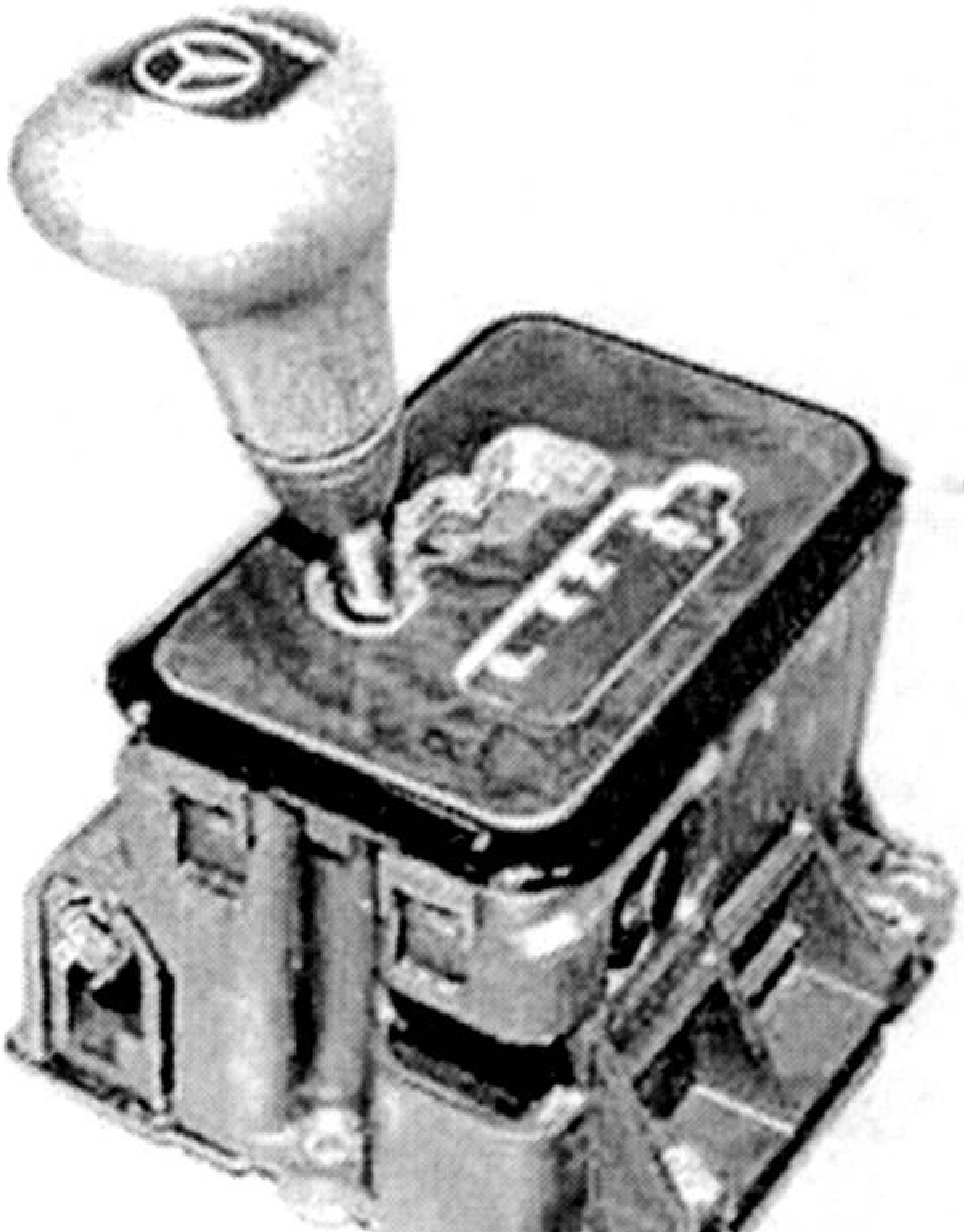


Fig. 149: Floor Shift, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Location/Task/Design/Function Of R/P Lock (Without Touch Shift)

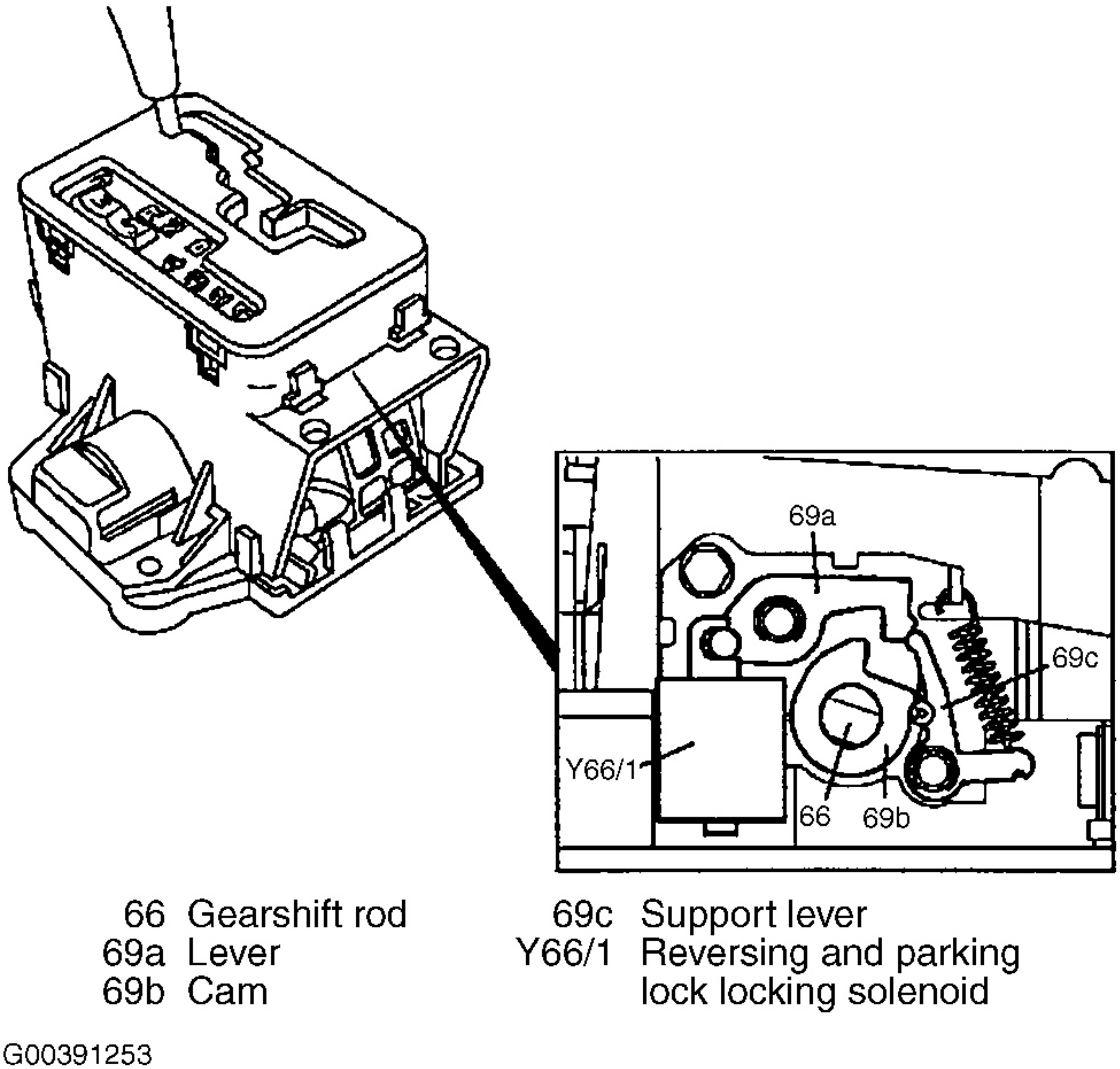


Fig. 150: R/P Lock Without Touch Shift
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

R/P Lock, Location

The R/P lock is located in the floor shift. See **Fig. 150**.

R/P Lock,Task

Prevents unintentional shifts to the selector lever positions "R" and "P" at driving speeds in excess of approximately 10 km/h.

R/P Lock, Design

The R/P lock consists of:

- The cam (69b) which is rigidly connected to the shift shaft (66).
- The lever (69s).
- The reverse and parking lock solenoids (Y66/1).
- The support lever (69c).

R/P Lock, Function

See **R/P LOCK, FUNCTION (WITHOUT TOUCH SHIFT)**.

R/P Lock, Function (Without Touch Shift)

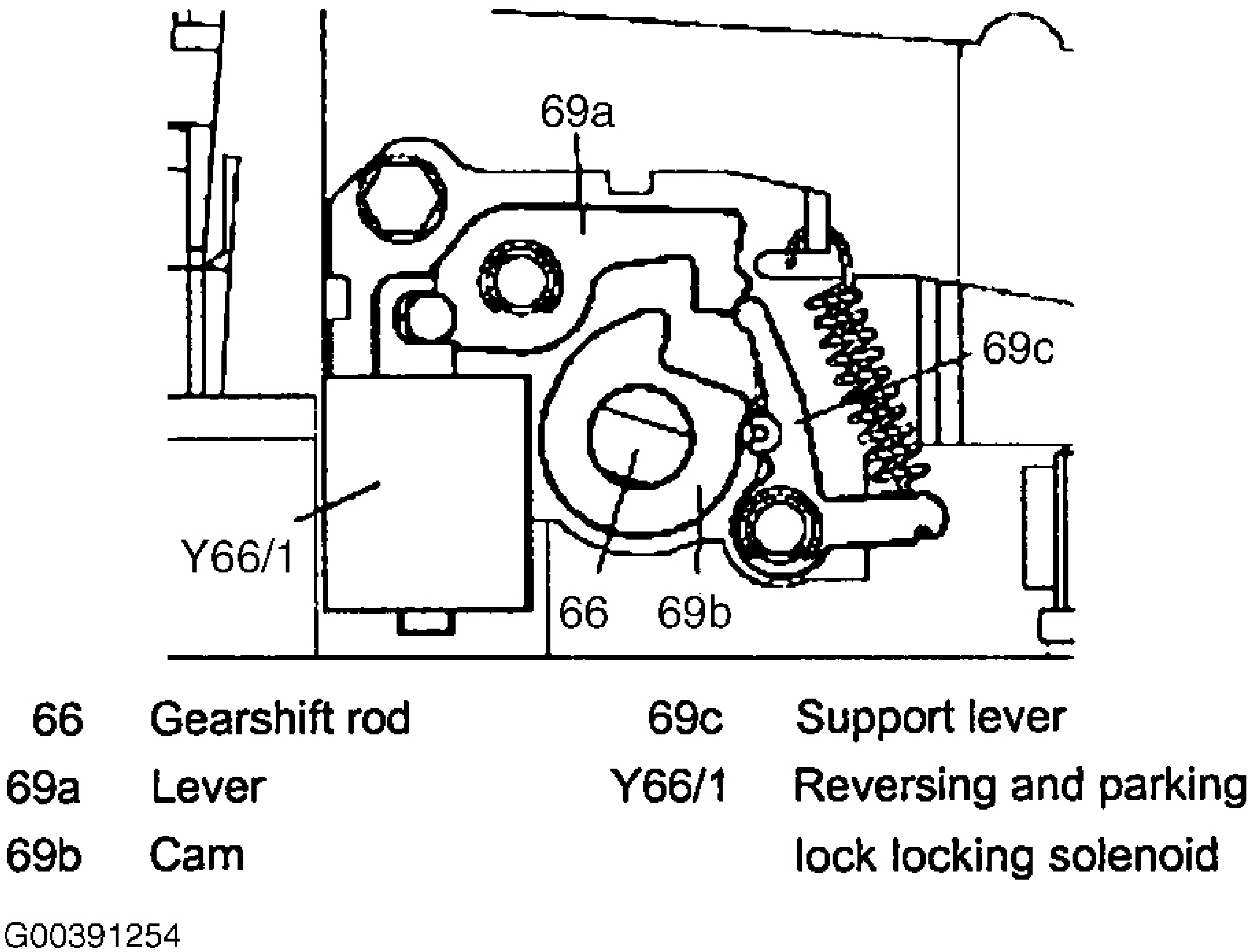


Fig. 151: R/P Lock, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The reverse and parking lock solenoid (Y66/1) is actuated via the ETC control module (N15/3) and moves the lever (69a) in the direction of the cam (69b) so that the shift shaft (66) is blocked. See **Fig. 151**. When de-energized, the support lever (69c) holds the lever (69a) in position to prevent it from engaging by itself when exposed to severe shocks.

Location/Task/Design/Function Of R/P Lock (With Touch Shift)

R/P Lock, Location

The R/P lock is integrated in the electronic selector lever module control module (N15/5).

R/P Lock, Task

Depending on the condition the R/P lock prevents shifting out of selector lever position "P" or changing into selector lever position "R" from "N".

R/P Lock, Design

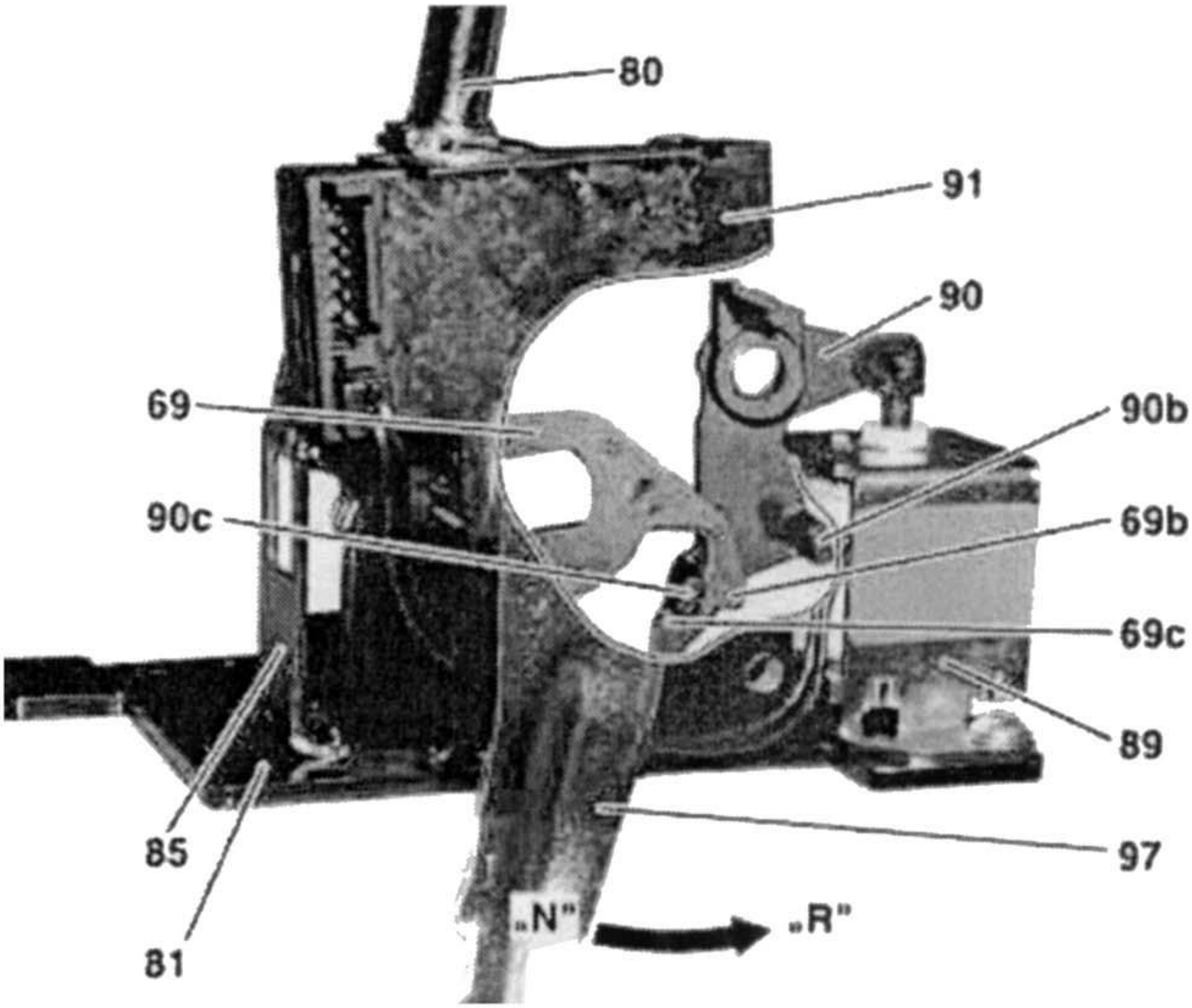
The R/P lock consists of:

- The locking disc (69) rigidly connected to the selector lever (80).
- The locking lever (90).
- The R/P locking solenoid (89).

R/P Lock, Function

See **R/P LOCK, FUNCTION**.

R/P Lock, Function (With Touch Shift)



R/P lock, function (locking position)

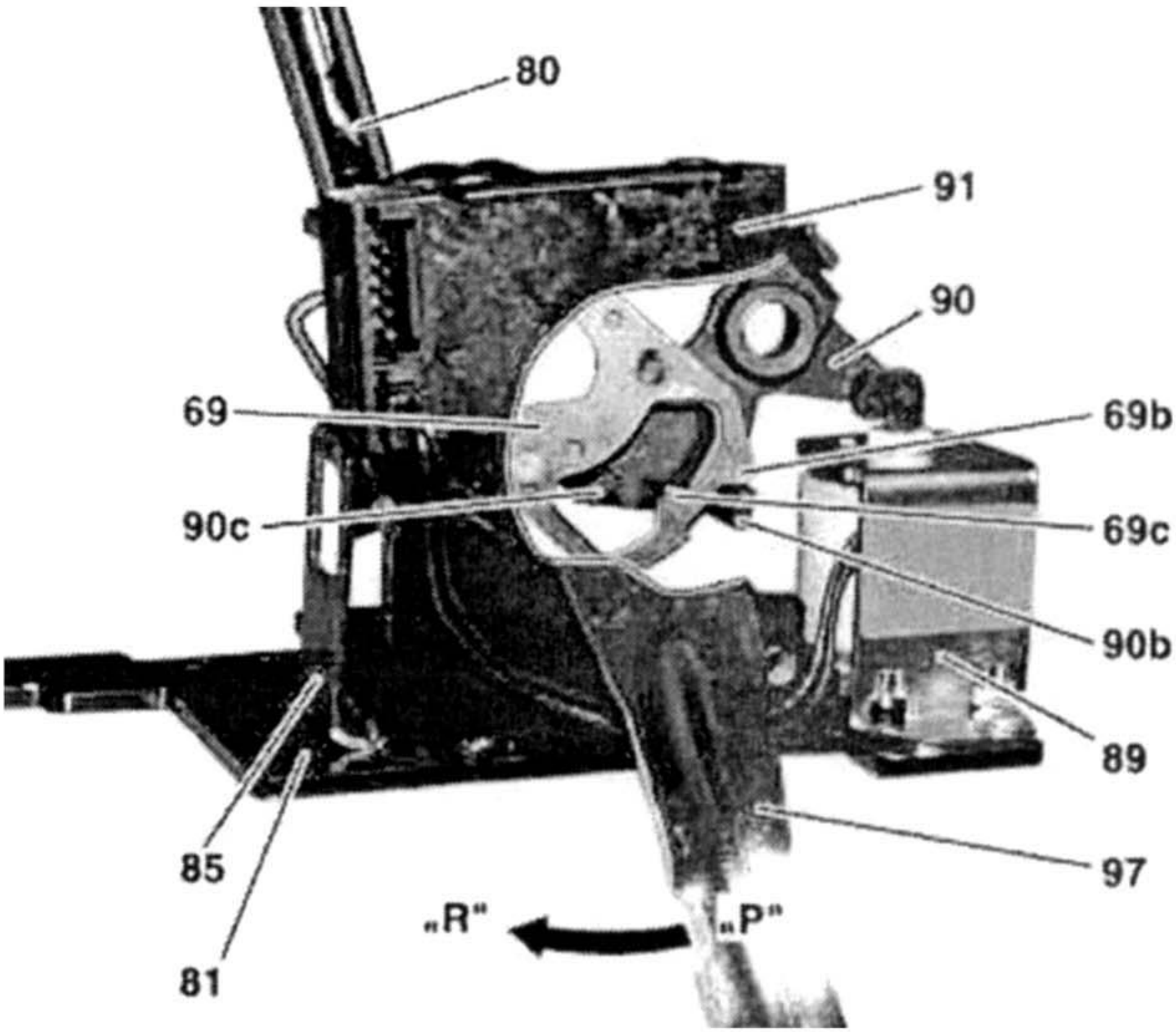
69	Locking disc	90	Locking lever
69b	Cam (P lock)	90b	Tab on lock lever (P lock)
69c	Cam (R lock)	90c	Tab on lock lever (R lock)
80	Selector lever	91	Potentiometer for recognition of selector lever position
81	base body	97	Intermediate lever
85	Left spring		
89	R/P locking solenoid		

G00391234

Fig. 152: R/P Lock, Function (Locking Position)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Function Of R Lock

Above a speed of approximately 10km/h the R/P locking solenoid (89) is actuated by the electronic selector lever module control module (N15/5). See **Fig. 152**. The R/P lock lever (90) is turned to the lock position (shift from "N" to "R"). The tab on the lock lever (R lock) (90c) locks (R-lock (69c) the locking disc (69). The selector lever (80) cannot be shifted into selector lever position "R".



P-lock, function (locking position)

69	Locking disc	90	Locking lever
69b	Cam (P lock)	90b	Tab on lock lever (P lock)
69c	Cam (R lock)	90c	Tab on lock lever (R lock)
80	Selector lever	91	Potentiometer for recognition of selector lever position
81	base body		
85	Left spring		

Fig. 153: P-Lock, Function (Locking Position)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Function Of P Lock

The selector lever position "P" is locked whenever R/P locking solenoid (89) is not actuated by the electronic selector lever module control module (N15/5). See **Fig. 153**. The prerequisites for this are as follows:

- No voltage supply to the electronic selector lever module control module (N15/5).
- Brake pedal not depressed.

Under these conditions the locking lever (90) is in the locking position (P-lock).

The web on the locking lever (P-lock) (90b) locks the locking disc (69). It is not possible to shift the selector lever (80) out of selector lever position "P".

Position Display, Location/Task

Transmission with touch shift.

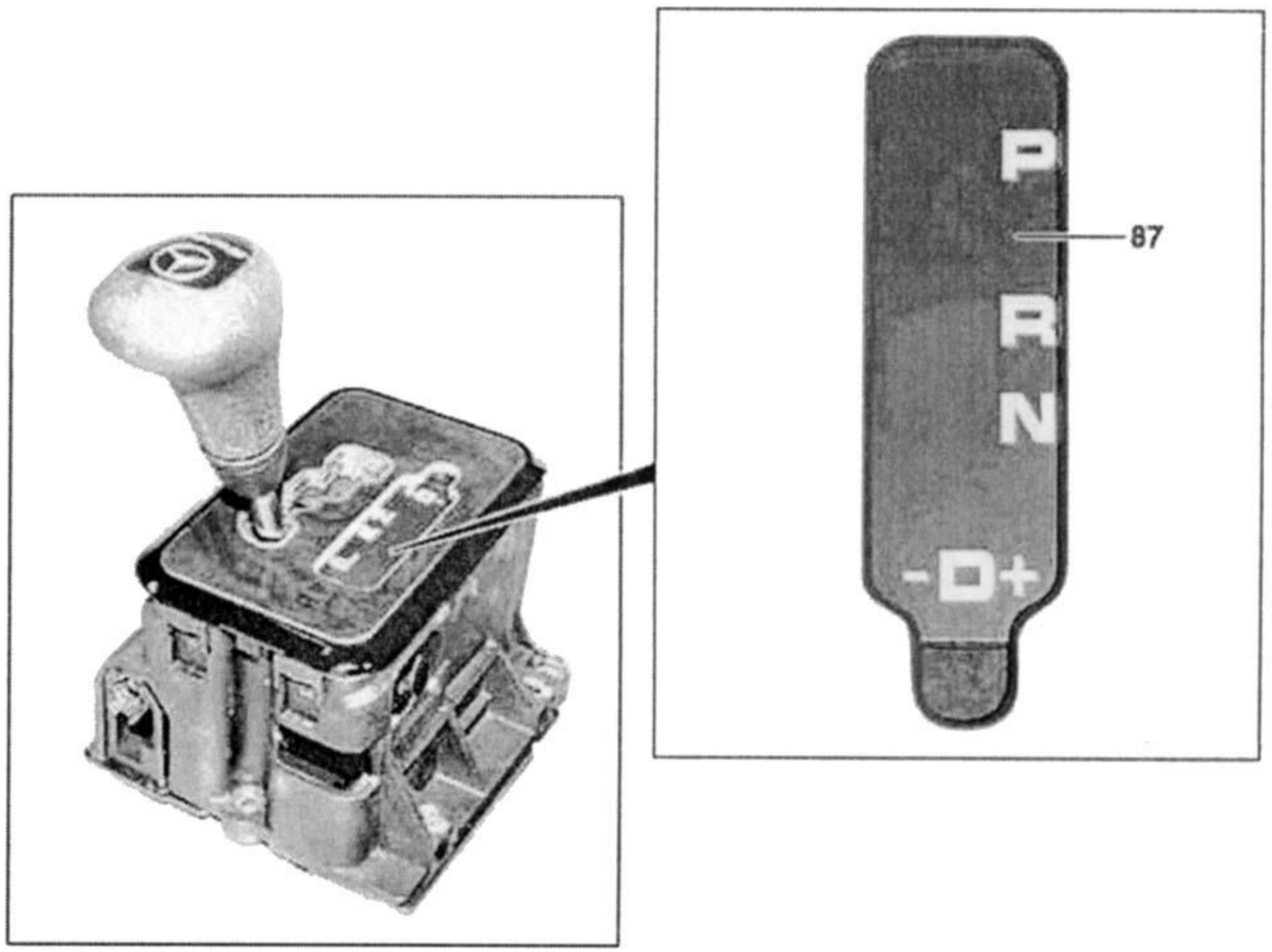


Fig. 154: Position Display, Location/Task
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Position Display, Location

The position display (selector scheme symbols (87)) is accommodated in the floor shift cover. See **Fig. 154**. In addition a gear display is located in the instrument cluster (A1).

Position Display, Task

Via the selector scheme symbols (87) the alternative selector lever positions and their sequence are shown symbolically.

ETC Control Unit, Location/Task

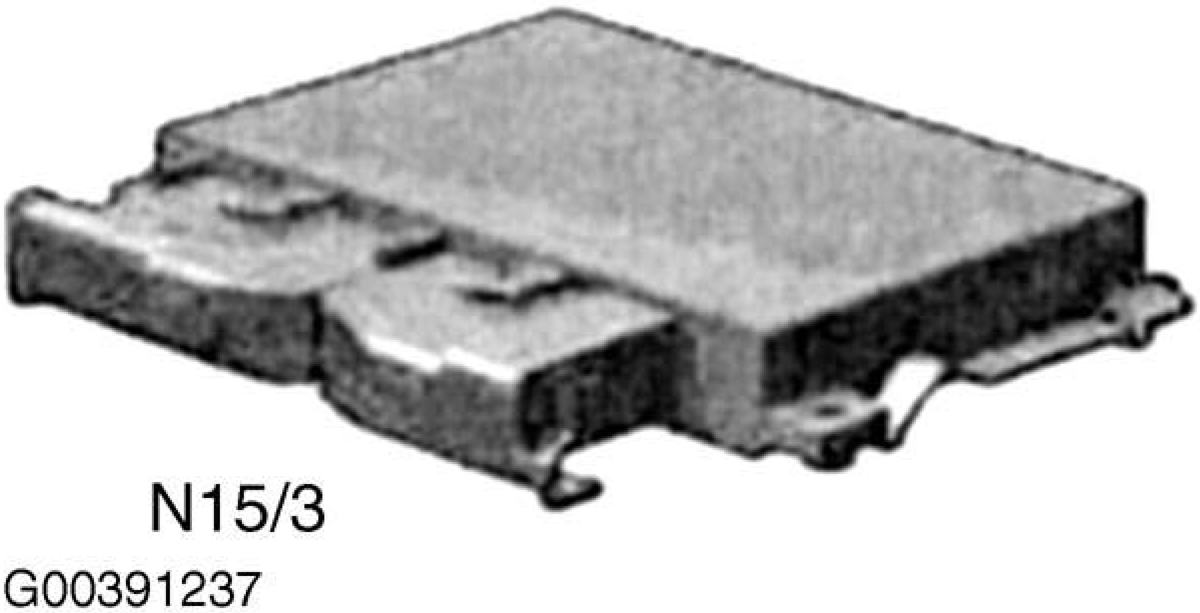


Fig. 155: ETC Control Unit, Location/Task
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

ETC Control Unit, Location

See **ETC Control Unit, Location**.

ETC Control Unit, Task

See **ETC Control Unit, Task** or **ETC Control Unit, Task** .

ETC Control Unit, Location

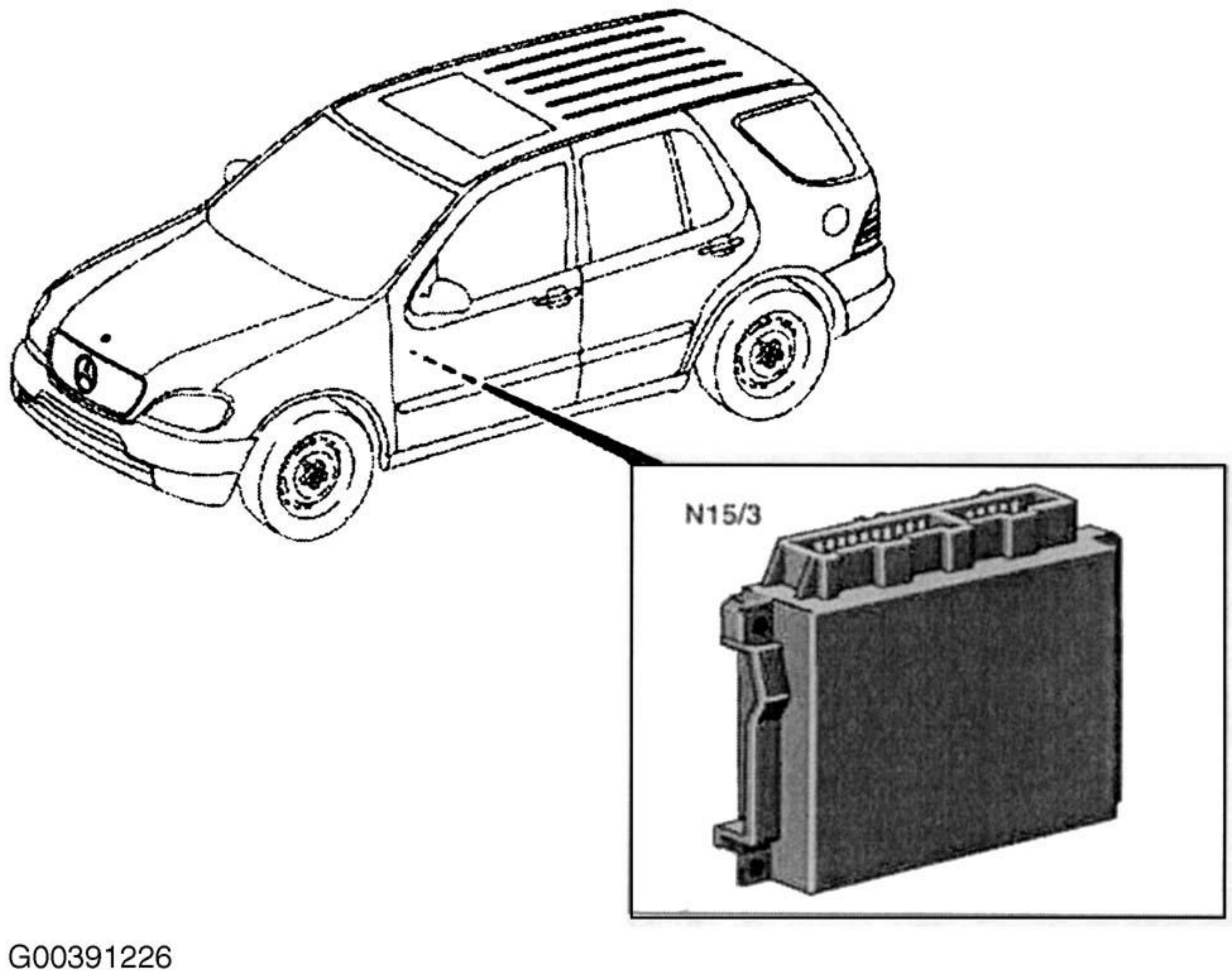


Fig. 156: ETC Control Module, Location
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Location

The ETC control module (N15/3) is installed in the left footwell, on the heater/air conditioning housing.

ETC Control Unit, Task

Transmission 722.6 in model 163 with touch shift

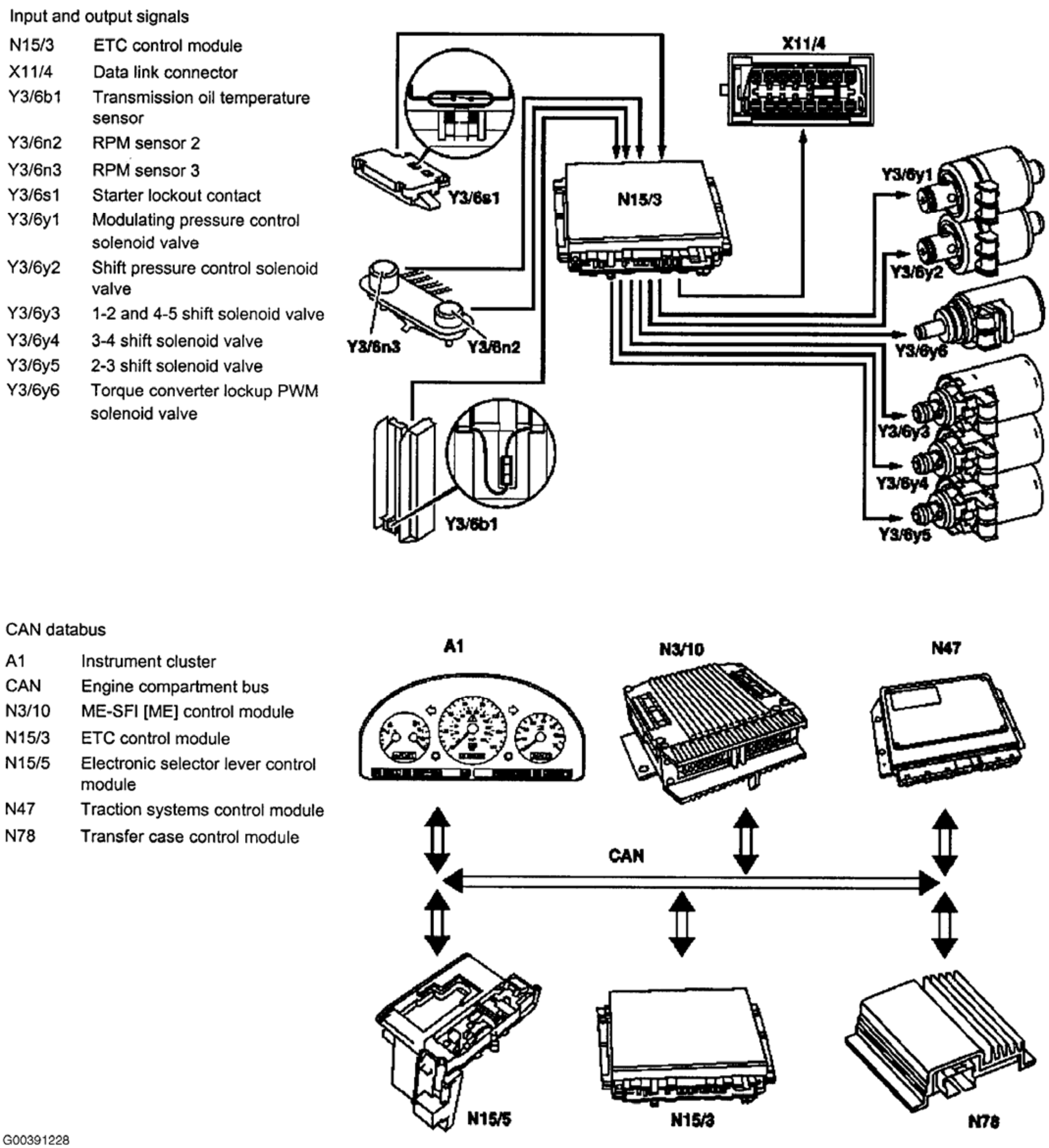


Fig. 157: ETC Control Module, Task With Touch Shift
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Task

The ETC control module (N15/3) determines the instantaneous operating condition of the vehicle and controls all gearshift sequences taking into account the ease of shifting and the driving situation. This involves receiving, converting and transmitting various digital and analog signals. See **Fig. 157**.

It receives operating data in the form of input signals from:

- Starter Lock-Out Contact (Y3/6S1)
- RPM Sensor 2 (Y3/6N2)
- RPM Sensor 3 (Y3/6N3)
- Transmission Oil Temperature Sensor (Y3/6B1)

In addition there is a connection via the engine compartment bus to the:

- Instrument Cluster (A1)
- ME-SFI Control Module (N3/10) or CDI Control Module (N3/9)

The solenoid valves for the modulating and shift pressure and for the gear changes are actuated by the ETC control module (N15/3).

The pressure required is calculated from all input signals, adjusted to the torque to be transferred. The following information from other systems is then processed:

ME-SFI Control Module (N3/10) or CDI Control Module (N3/9):

- Engine Torque
- Engine Speed
- Accelerator Pedal Position
- Gear Shift
- Engine Status

Electronic selector lever module control module (N15/5):

- Kickdown Switch (S16/6)
- Selector Lever Position P/N

Traction system control module (N47):

- Transmission Ratio
- Speeds

Instrument cluster (A1):

- Selector Lever Position/Shift Range

ETC Control Unit, Task

Transmission 722.6 in Model 163 Without Touch Shift

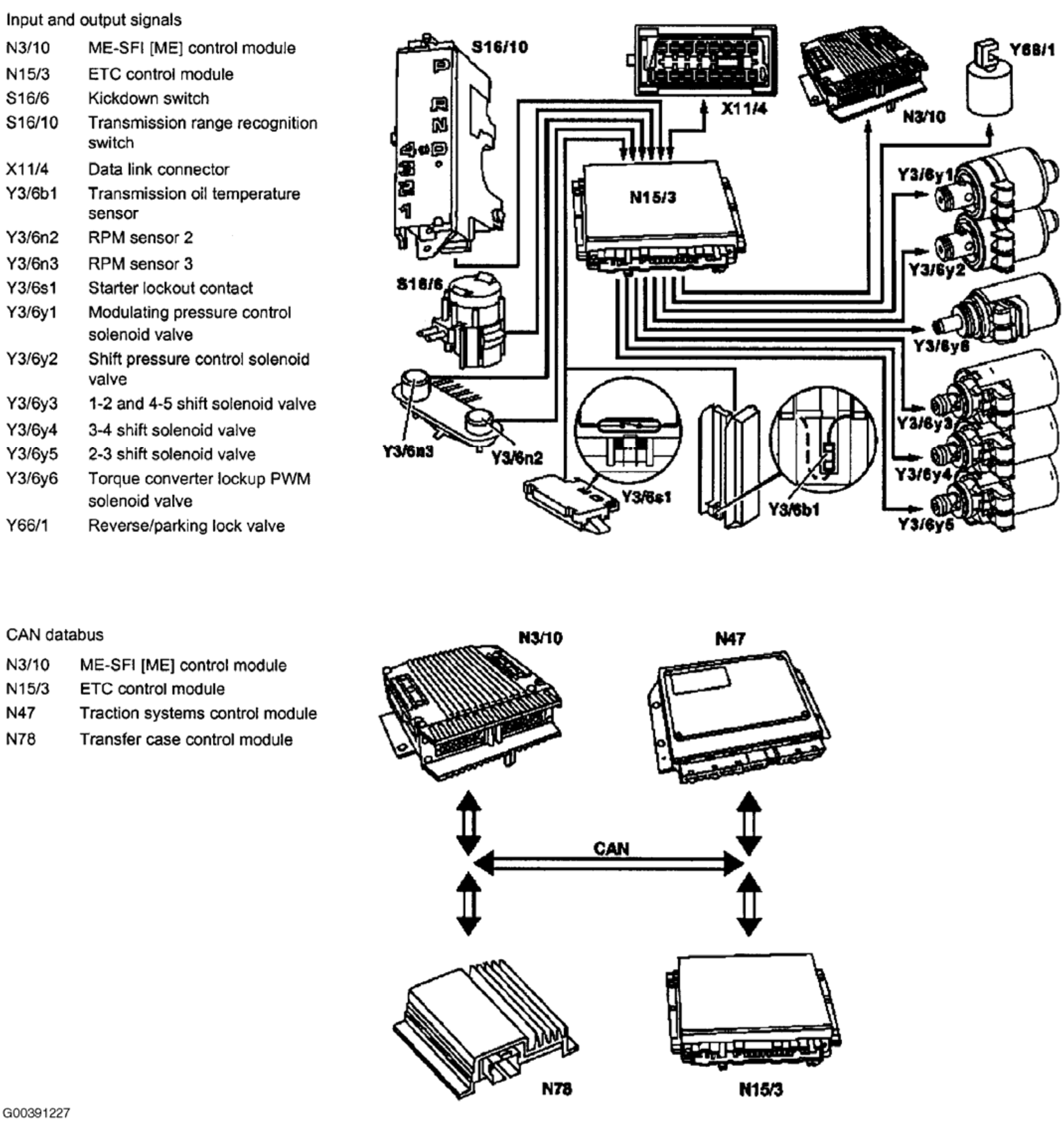


Fig. 158: ETC Control Module without Touch Shift
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Task

The ETC control module (N15/3) determines the instantaneous operating condition of the vehicle and controls all gearshift sequences taking into account the ease of shifting and the driving situation. See **Fig. 158**. This involves receiving , converting and transmitting various digital and analog signals.

Input Signals:

- Starter Lock-Out Contact (Y3/6S1)
- RPM Sensor 2 (Y3/6N2)
- RPM Sensor 3 (Y3/6N3)
- Transmission Oil Temperature Sensor (Y3/6B1)
- Kickdown Switch (S16/6)
- Gear Recognition Switch (S16/10)

Output signals:

- Reverse/Parking Lock Valve

Input And Output Signals:

- Datalink Connector (X11/4)

In addition there is a connection via the engine compartment bus to the:

- ME-SFI Control Module (N3/10) or CDI Control Module (N3/9)
- Traction System Control Module (N47)
- Transfer Case Control Module (N78)

The solenoid valves for the modulating and shift pressure and for the gear changes are actuated by the ETC control module (N15/3). The pressure required is calculated from all input signals, adjusted to the torque to be transferred.

The following information from other systems is then processed:

- ME-SFI Control Module (N3/10) or CDI Control Module (N3/9)
- Reverse And Parking Lock Solenoids (Y66/1)
- Selector Lever Position (P/N) to the Engine Control Module (ME-SFI) (N3/10) (only on detection of the selector lever position "P" or "N" on the transmission range recognition switch (S16/10) and at the starter interlock contact (Y3/6s1)).

Traction System Control Module (N47):

- Wheel Speeds
- Gear Shift
- Traction Status

Transfer Case Control Module (N78):

- Position of Transfer Case (off-road or on-road ratio)
- Engine Torque
- Engine Speed
- Accelerator Pedal Position
- Gear Soft
- Engine Status

The following information is output to other systems:

ME-SFI Control Module (N3/10) or CDI Control Module (N3/9):

- Kickdown Switch (S16/6)
- Engage Drive Mode

Traction System Control Module (N47):

- Transmission Ratio
- Speeds

Oil Level Control, Function

Operation - The oil level control system seals the opening between the oil gallery and gearset chamber so that the rotating gearsets do not splash about in oil as the oil level rises. The oil level control reduces power loss and prevents oil from being thrown out of the transmission housing at high oil temperatures.

Float, Location/Function

See **SHIFT PRESSURE REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Transmission Housing Breathing, Location/Task

See **TRANSMISSION HOUSING BREATHING, LOCATION/TASK**.

Function Of Torque Converter Lockup Clutch Control

Operation

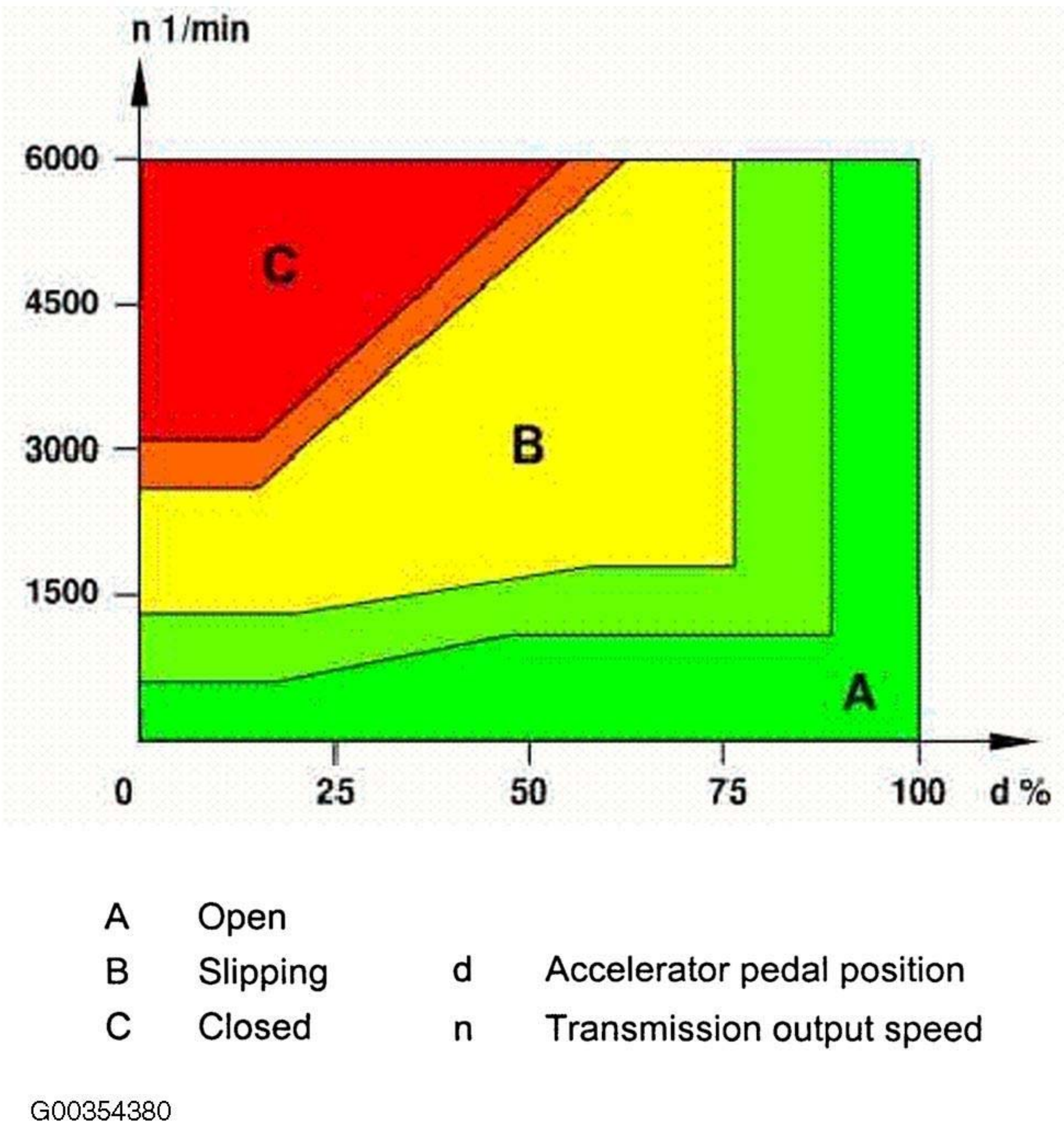


Fig. 159: Function Of Torque Converter Lockup Clutch Control
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

The aim of using the torque converter lockup clutch is to reduce the fuel consumption and exhaust gas emissions of the vehicle by reducing torque converter slip. See **Fig. 159**. This stands in contradiction to the ride comfort demands made on the drive train with regard to its vibration behavior. The task of the electronic transmission control is therefore to close the clutch in all driving situations relevant to fuel consumption, if possible, and ensure that the engine vibrations are isolated from the drive train.

The characteristic curves shown in the diagram illustrate the different operating states of the torque converter lockup clutch in relation to the accelerator pedal position and transmission output speed, plotted for one transmission gear.

In addition to the evaluation of these characteristics, the status of the torque converter lockup clutch is also determined by other variables.

Variables influencing the states of the torque converter lockup clutch:

- Accelerator Pedal Movement
- Uphill And Down Hill Gradients
- Transmission Shift Functions
- ATF Temperature
- Durability Requirements
- Load Condition
- Engine Control Influences

Torque Converter Lockup Clutch Control Pressure, Function

See **TORQUE CONVERTER LOCKUP CLUTCH CONTROL PRESSURE, FUNCTION**.

Torque Converter Lockup Clutch Control Pressure, Function

Apart from extreme states of open or closed, it is possible to operate the torque converter lockup clutch with preset slip speeds. To enable this variable control pressure must be applied to the torque converter lockup clutch regulating valve.

The torque converter lockup clutch control pressure is adapted to each operating state via the pulse-width modulated torque converter lockup solenoid valve (Y3/6y6) which is actuated by the ETC control unit (N15/3).

Torque Converter Lockup Clutch PWM Solenoid Valve, Location/Task/Design/Function

See **LOCATION/TASK/DESIGN/FUNCTION OF PWM SOLENOID VALVE, TORQUE CONVERTER LOCKUP CLUTCH**.

Torque Converter Lockup Clutch, Location/Task/Design/Function

See **TORQUE CONVERTER LOCK-UP CLUTCH, LOCATION/TASK/DESIGN/FUNCTION**.

Torque Converter Lockup Clutch Regulating Valve, Location/Task/Function

See **TORQUE CONVERTER LOCKUP CLUTCH REGULATING VALVE, LOCATION/TASK/FUNCTION**.

Kick-Down Function (Up To 5/31/02) (With Touch Shift)

Transmission With Touch Shift 722.6 In Model 163

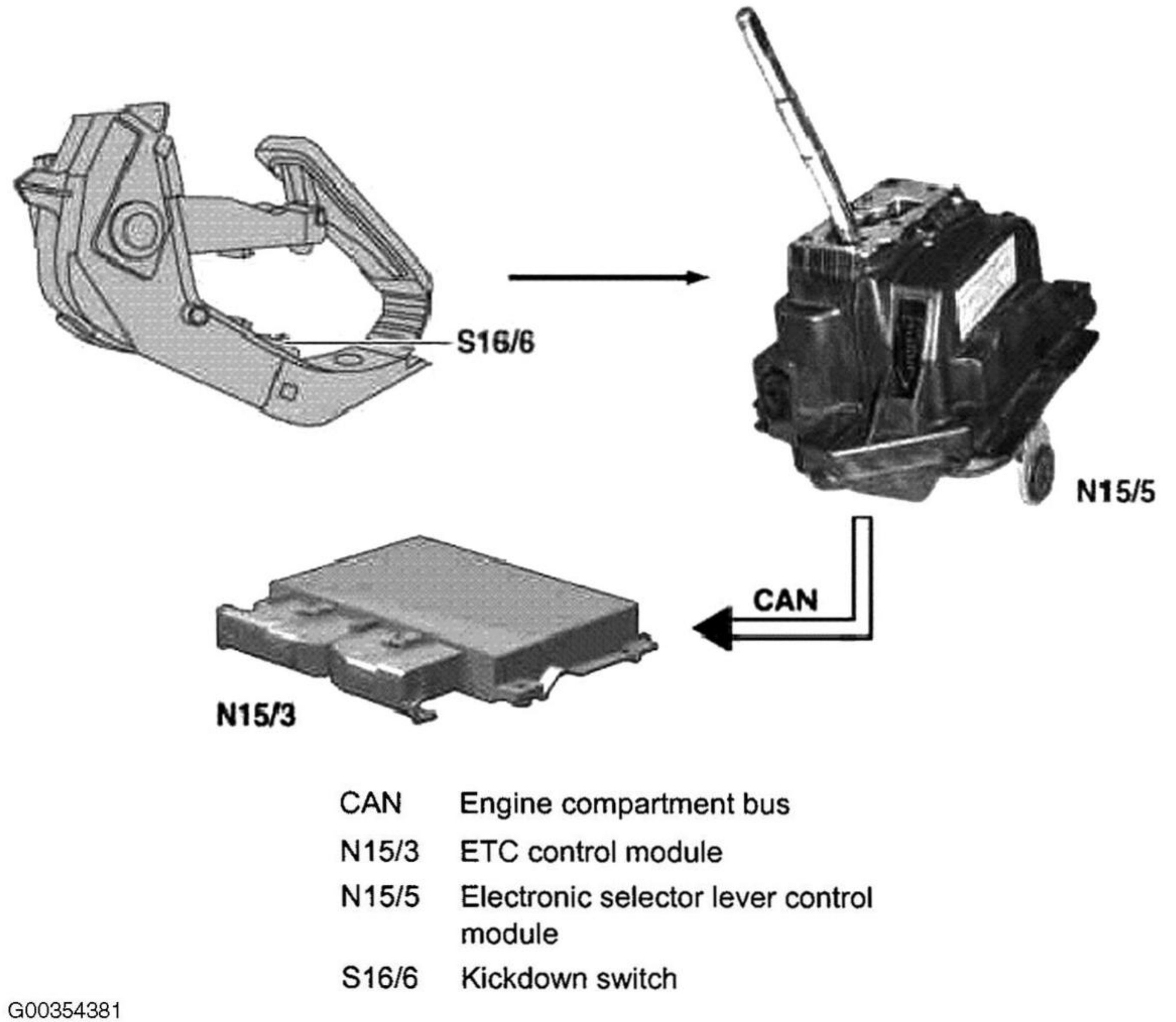


Fig. 160: Kick-Down Function (Up To 5/31/02)

Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The driver's wish for maximum acceleration of the vehicle is met with the kick-down function. See **Fig. 160**.

When the kick-down switch (S16/6) is operated a CAN Signal is passed on from the electronic selector lever module control module (N15/5) to the ETC control module (N15/3) via the electronic accelerator.

Based on this information the ETC control module (N15/3) actuates the solenoid valves so that the upshifts and downshifts take place at higher engine speeds in order to achieve maximum performance.

Kick-Down Switch, Location/Task/Design

See **KICK-DOWN SWITCH, LOCATION/TASK/DESIGN**.

Hydropneumatic Transmission Control, Function (Without Touch Shift)

Operation

The hydropneumatic transmission control is divided into electronic and hydraulic transmission control.

While the electronic transmission control is responsible for gear selection and for matching the pressures to the torque to be transmitted, the transmission's power supply control occurs via hydraulic elements in the electrohydraulic control module. The oil supply to the hydraulic elements, such as the hydrodynamic torque converter, the shift elements and the hydraulic transmission control, is provided by way of an oil pump connected with the torque converter.

The electronic transmission control (ETC) allows for the precise adaptation of pressures to the corresponding operating conditions and to the engine output during the gearshift phase, resulting in a noticeable improvement in shift quality.

It is possible to reach the engine RPM limit in the individual gears using full throttle and kick-down. The shift range can be changed in the forward gears while driving, but the electronic transmission control (ETC) employs a downshift safeguard to prevent over-revving the engine.

The system offers the additional advantage of flexible adaptation to different vehicle and engine variants.

ETC Control Module, Location/Task

See **ETC CONTROL UNIT, LOCATION/TASK**.

Electric Control Module, Location/Task/Design/Function

See **ELECTRONIC CONTROL MODULE, LOCATION/TASK/DESIGN/FUNCTION**.

Kickdown Switch, Location/Task/Design/Function Model 163 Without Touch Shift

See **KICKDOWN SWITCH, LOCATION/TASK/DESIGN/FUNCTION MODEL 163 WITHOUT TOUCH SHIFT**.

Starter Lock-Out Contact, Location/Task/Design/Function

See **STARTER LOCK-OUT CONTACT, LOCATION/TASK/DESIGN/FUNCTION**.

Temperature Sensor, Location/Task/Design/Function

See **TEMPERATURE SENSOR, LOCATION/TASK/DESIGN/FUNCTION**.

Wheel Speed Sensor, Location/Task/Function

See **WHEEL SPEED SENSOR, LOCATION/TASK/FUNCTION**.

Location/Task/Design/Function Of Oil Pump

See **LOCATION/TASK/DESIGN/FUNCTION OF OIL PUMP**.

Kickdown Switch, Location/Task/Design/Function Model 163 Without Touch Shift

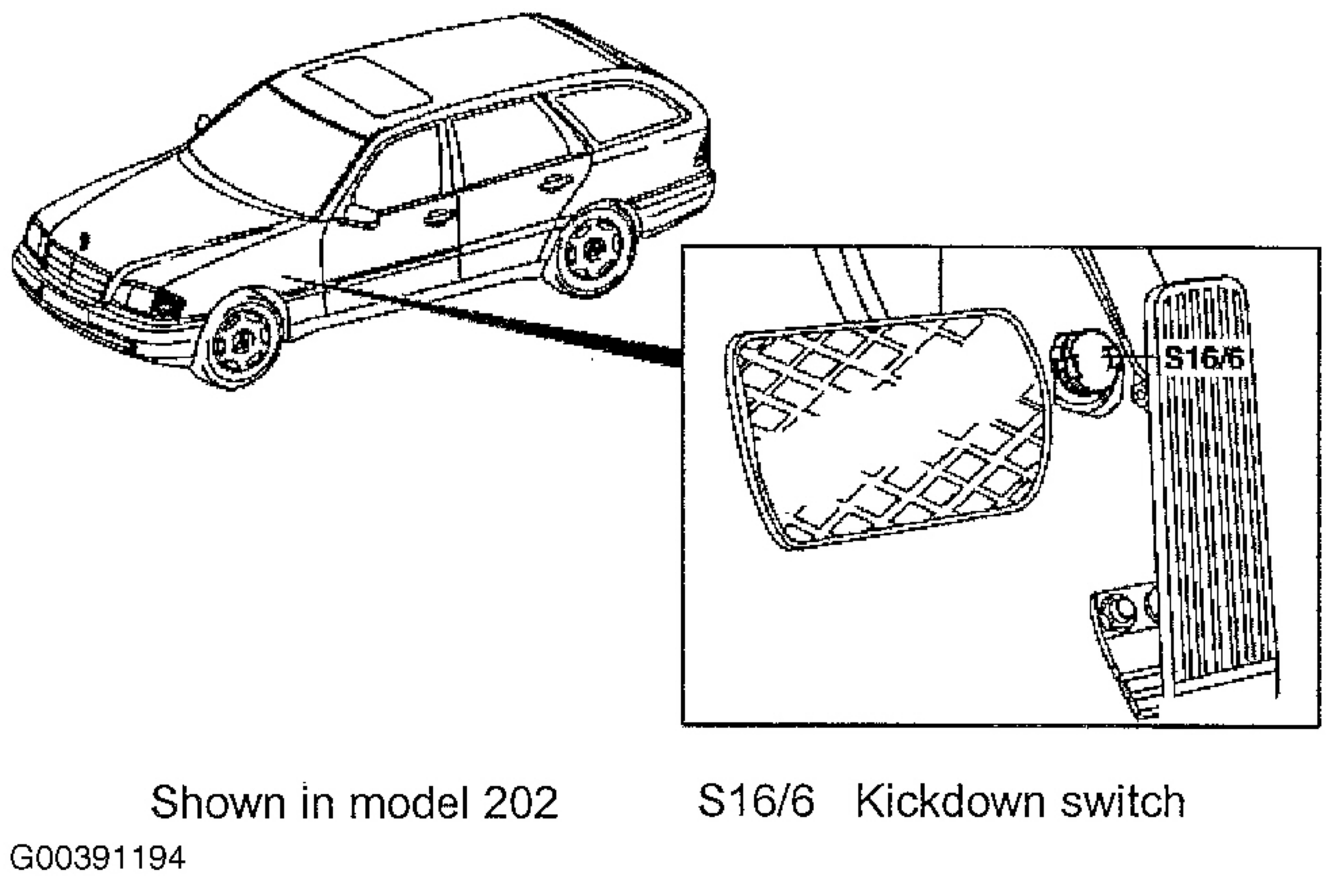


Fig. 161: Kickdown Switch
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Kickdown Switch Position

The kickdown switch (S16/6) is located in the footwell behind the accelerator pedal. See **Fig. 161**.

Kickdown Switch Task

Influencing the shift program of the electronic transmission control.

Kickdown Switch Design

The kickdown switch (S16/6) consists of a spring-tensioned electrical switch contact.

Kickdown Switch Function

When the kick-down switch (S16/6) is operated via the accelerator pedal a signal is passed on to the ETC control module (N15/3). Based on this information the ETC control module (N15/3) actuates the solenoid valves so that the upshifts and downshifts take place at higher engine speed.

Shift-Lock Function

Operation

The term shift lock combines the functions which, in addition to the parking brake, offer an additional safeguard for the vehicle to prevent it moving off unintentionally.

These include the functions of locking the selector lever position "P" and locking the ignition lock as well as the parking lock in the transmission.

The shift lock function only allows shifting out of selector lever position "P" if the transmitter key (A8/1) has been turned into the position "Ignition: ON" and the brake pedal is depressed.

In order to ensure that after parking the vehicle the selector lever is shifted into selector lever position "P", the transmitter key (A8/1) can only be turned towards "0" in this position and removed from the EZS control module (N73) (ignition lock locking, function).

The vehicle is secured mechanically by blocking the park pawl gear.

In the event of mechanical or electrical/electronic faults it is possible to unlock selector lever position "P" manually (shift lock override function).

Function Of Locking Of Selector Lever Position "P"

See **FUNCTION OF LOCKING OF SELECTOR LEVER POSITION "P"**.

Ignition Lock Locking, Function

See **IGNITION LOCK INTERLOCK**.

Function Of Shift Lock Override

See **FUNCTION OF SHIFT LOCK OVERRIDE**.

Function Of Locking Of Selector Lever Position "P" (With Touch Shift)

Operation

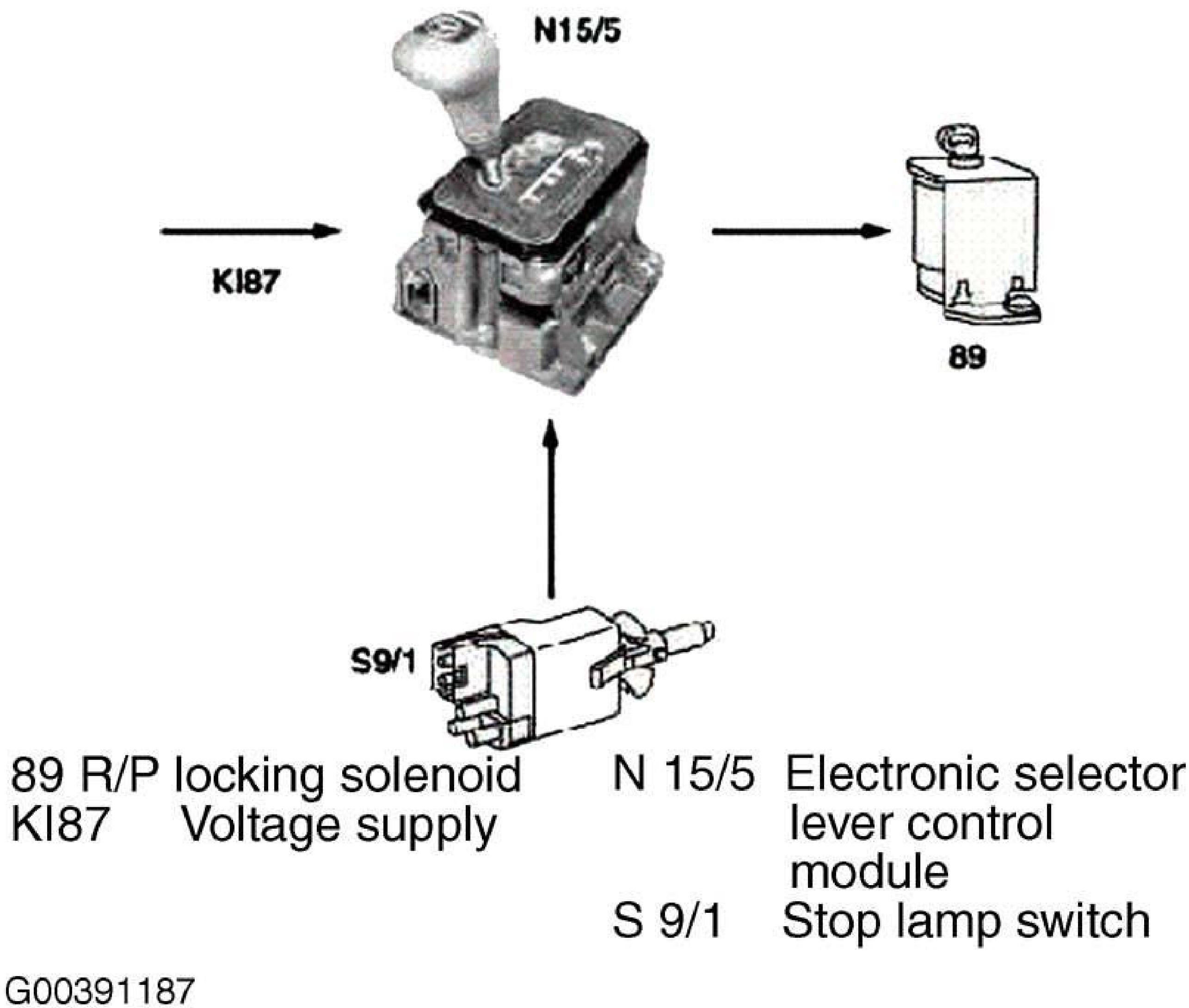


Fig. 162: Function Of Locking Of Selector Lever Position "P"
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

One of the functions of the shift lock is to lock the selector lever in position "P". The selector lever is locked electronically. See **Fig. 162**.

The selector lever remains disabled in position "P", if the brake is not operated or there is no power supply to the electronic selector lever module control module (N15/5) (circuit 87).

The electronic selector lever module control module (N15/5) actuates the R/P lock solenoid valve (89) from the

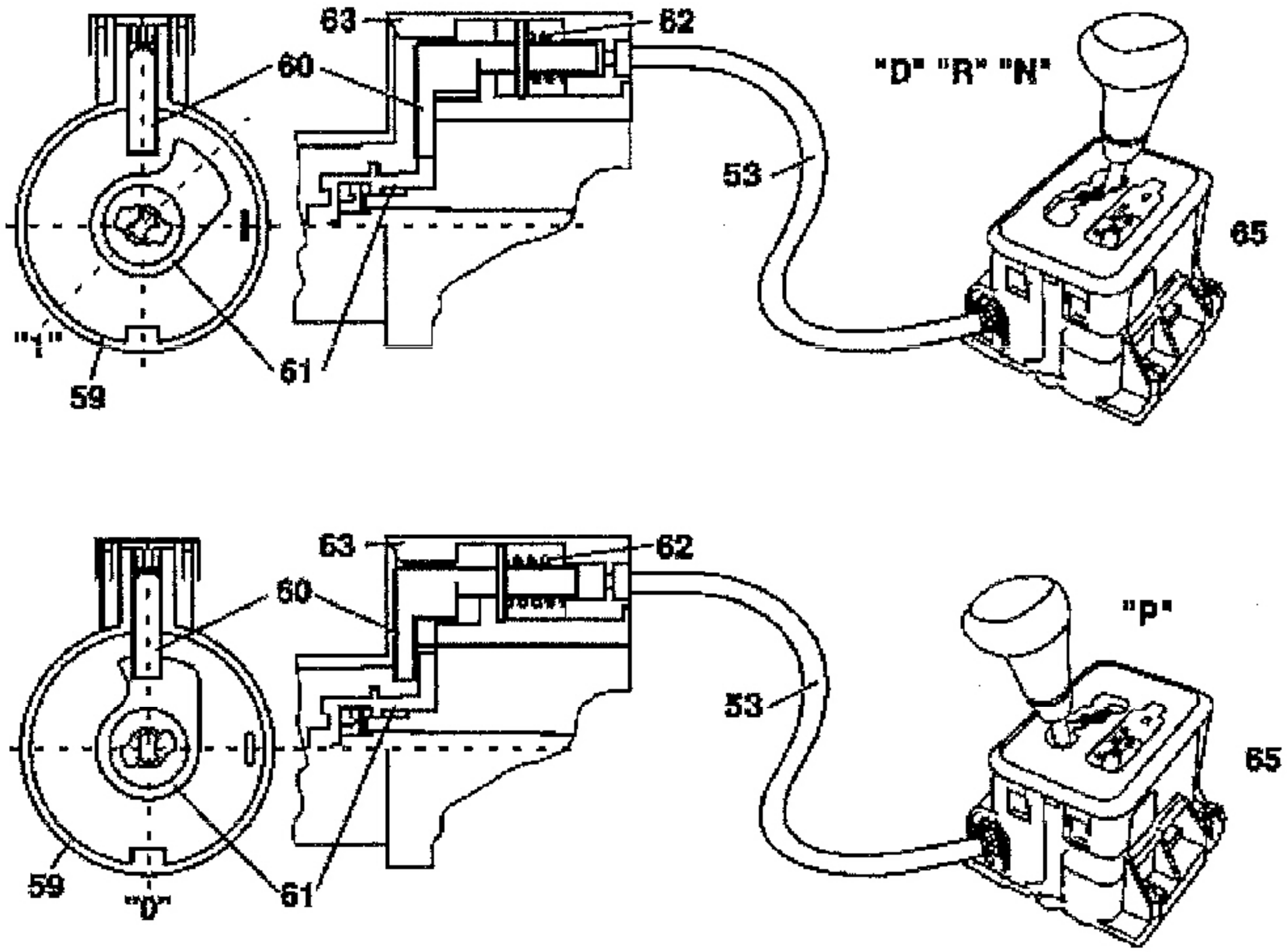
ignition key position Ignition "ON" when the brake pedal is depressed and therefore when the brake lamp switch (S9/1) is actuated and when selector lever position "P" is recognized.

The R/P locking magnet (89) releases the selector lever thus allowing the selector lever to be moved away from position "P".

Parking Lock, Location/Task/Design/Function - See **PARK PAWL, LOCATION/TASK/DESIGN/FUNCTION**.

Ignition Lock Interlock

Operation



"0" transmitter key (A8/1) in position 0

"1" transmitter key (A8/1) in position 1

59 Ignition lock control cable

60 Ignition lock

61 Locking valve Locking cam

62 Compression spring

63 Ignition lock adapter housing

65 Floor-mounted shift

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Fig. 163: Ignition Lock Interlock

Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

The mechanism of the ignition lock interlock connects the selector lever of the floor shift with the ETC control module (N73). See **Fig. 163**. It prevents the transmitter key (A8/1) from being withdrawn when the selector lever is not at position "P".

When the parking lock is not engaged (selector lever position "D", "R", "N"), the locking valve (60) locks the locking cam (61). The compression spring (62) only pulls the locking valve (60) away from the locking cam (61) in selector lever position "P". The transmitter key (A8/1) can now be turned to position "0" and removed from the ignition.

Parking Lock, Location/Task/Design/Function

See **PARK PAWL, LOCATION/TASK/DESIGN/FUNCTION**.

Function Of Shift lock Override

Transmission with touch shift 722.6 in MODEL 163

Operation

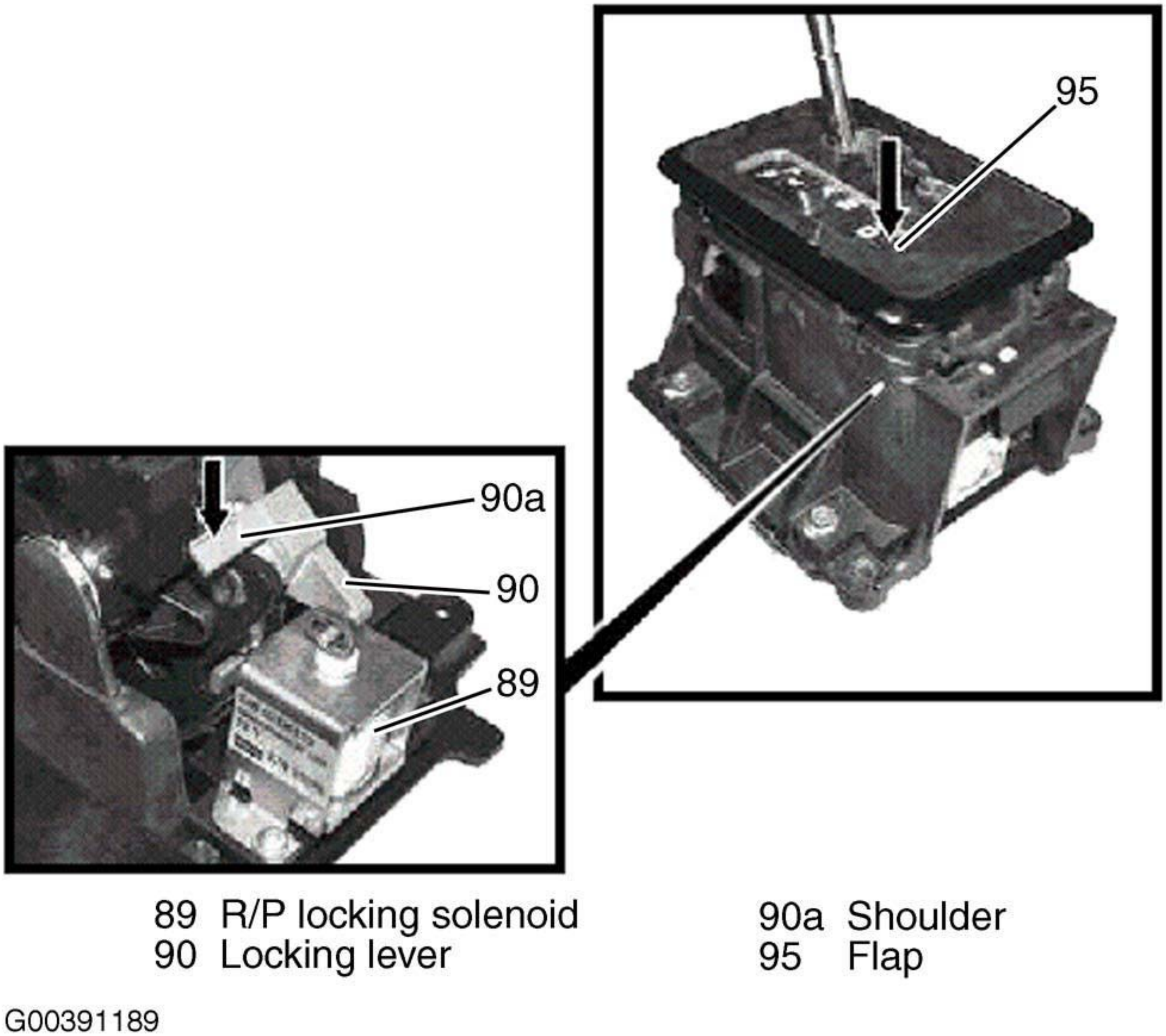


Fig. 164: Function Of Shift Lock Override
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

If it is not possible to engage a drive position from selector lever position "P" due to a mechanical or electrical/electronic fault, the selector lever position "P" lock can be released using the shift lock override function. See **Fig. 164**.

To do this a suitable tool must be guided through the flap (95) onto the web (90a) and the web pressed gently downwards (arrow). The lock lever (90) releases the selector lever. The selector lever can be moved from

position "P" by simultaneously operating the lock lever.

Location/Task/Design/Function Of R/P Lock

See **LOCATION/TASK/DESIGN/FUNCTION OF R/P LOCK**.

Parking Lock, Location/Task/Design/Function

See **PARK PAWL, LOCATION/TASK/DESIGN/FUNCTION**.

Function Of Torque Converter Lockup Clutch Control

Operation

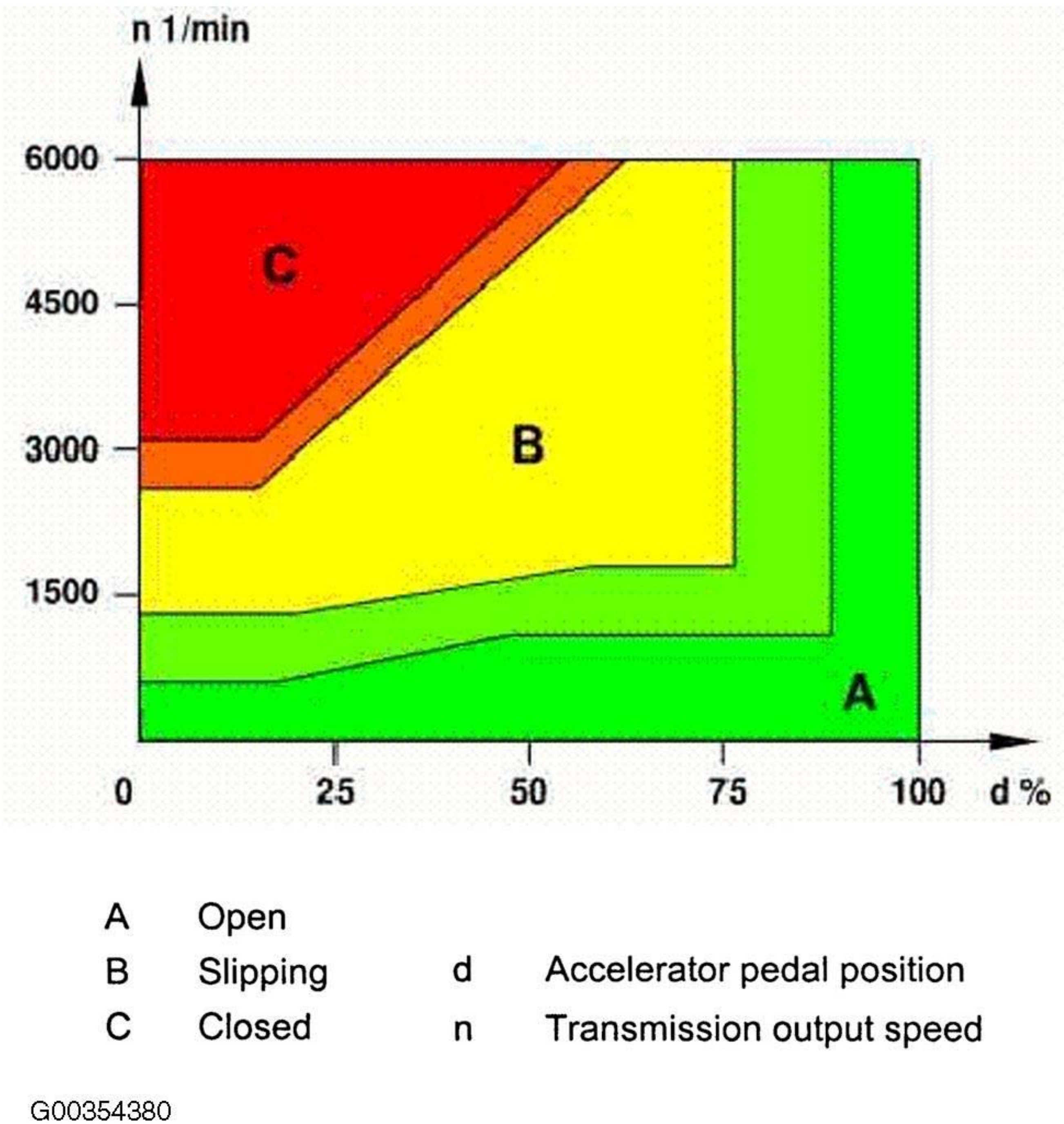


Fig. 165: Function Of Torque Converter Lockup Clutch Control
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

The aim of using the torque converter lockup clutch is to reduce the fuel consumption and exhaust gas emissions of the vehicle by reducing torque converter slip. See **Fig. 165**. This stands in contradiction to the ride comfort demands made on the drive train with regard to its vibration behavior. The task of the electronic transmission control is therefore to close to the clutch in all driving situations relevant to fuel consumption, if possible, and ensure that the engine vibrations are isolated from the drive train.

The characteristic curves shown in the diagram illustrate the different operating states of the torque converter lockup clutch in relation to the accelerator pedal position and transmission output speed, plotted for one transmission gear.

In addition to the evaluation of these characteristics, the status of the torque converter lockup clutch is also determined by other variables.

Variables influencing the states of the torque converter lockup clutch:

- Accelerator Pedal Movement
- Uphill And Down Hill Gradients
- Transmission Shift Functions
- ATF Temperature
- Durability Requirements
- Load Condition
- Engine Control Influences

Torque Converter Lockup Clutch Control Pressure, Function

See **TORQUE CONVERTER LOCKUP CLUTCH CONTROL PRESSURE, FUNCTION**.

REMOVE/INSTALL TRANSFER CASE

Remove/Install

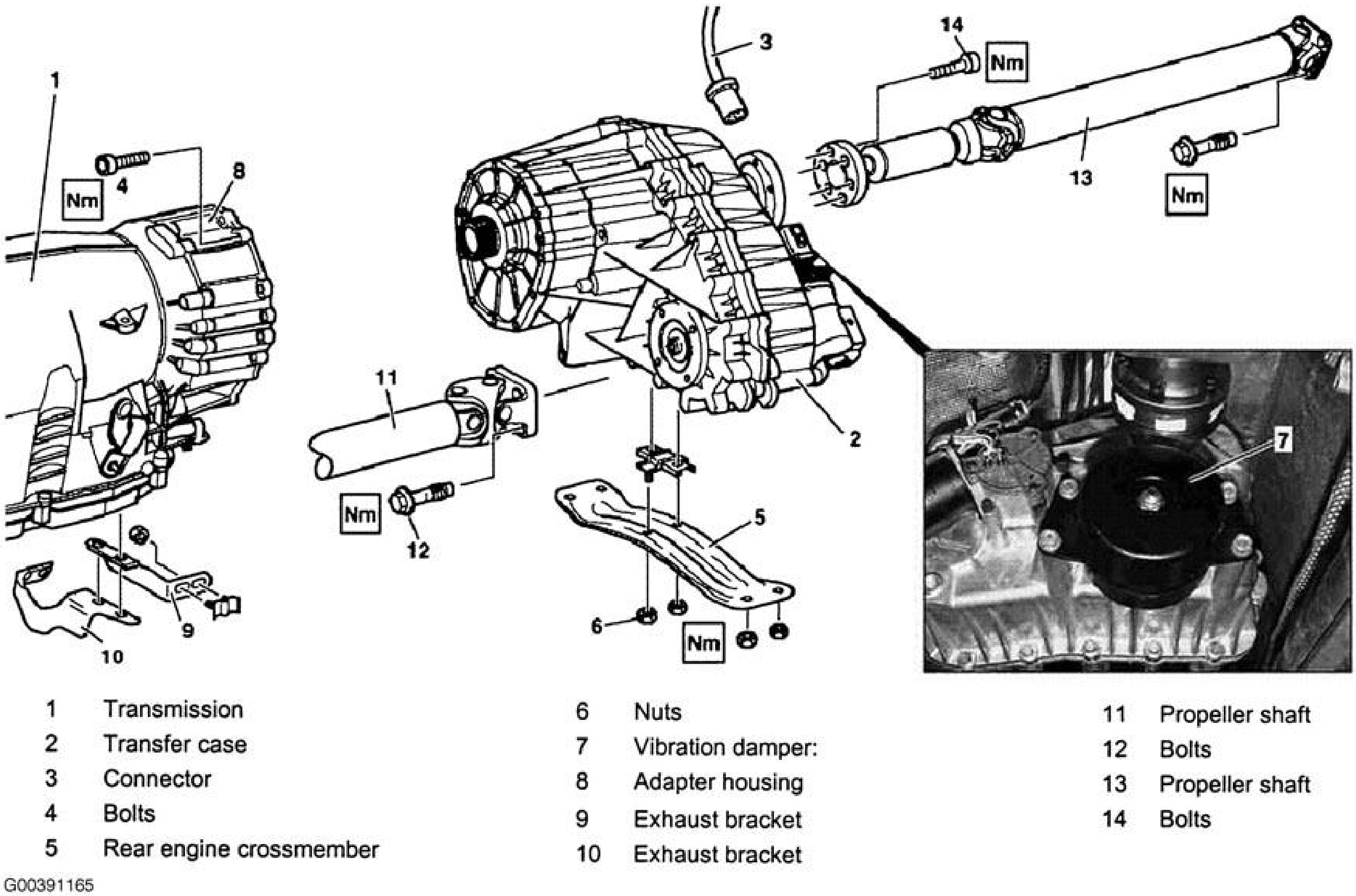


Fig. 166: Removing & Installing Transfer Case
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

1.1 - Remove noise encapsulation. See **REMOVE/INSTALL NOISE ENCAPSULATION**.

NOTE: **Model 163.113/128**
Only remove rear section of noise encapsulation.

2 - Unscrew exhaust bracket (9) and exhaust bracket (10) to exhaust. See **Fig. 166**.

3 - Unscrew bolts (14) and remove propeller shaft (13) from transfer case.

NOTE: **Hang up propeller shaft to one side and ensure that the universal joint and center bearing are not damaged.**
Self-locking screw for front propeller shaft on transfer case (rear axle side). See Torque Specifications; Driveshaft.

4 - Unscrew bolts (12) and remove propeller shaft (11) from transfer case.

NOTE: **Hang up propeller shaft to one side and ensure that the universal joint is not damaged.**

Self-locking bolt, propeller shaft to transfer case (to front axle). See Torque Specifications; Driveshaft.

5 - Detach plug (3) from actuator motor.

6 - Support transmission and remove rear engine crossmember (5) with engine mount.

NOTE:

Engine 112:

Bolt of rear engine crossmember to body.

Engine 112:

Bolt or nut, rear engine mount to transmission.

7 - Slightly lower engine transmission unit.

NOTE: **Ensure that no lines are damaged.**

8 - Support transfer case (2) with lifting device. See **SUPPORTING TRANSMISSION WITH INSPECTION PIT LIFT**.

NOTE: **Transmission plate.**

9 - Unscrew bolts (4) and take out transfer case to the back.

NOTE: **Bolt, transfer case to automatic transmission.**
Bolt, transfer case to manual transmission.

10 - Install in the reverse order.

11 - Check filling capacity of transfer case.

NOTE: **Correct oil level: Bottom edge of filler hole.**

Screw plug to transfer case.

Check transfer case (2) for leaks.

Torque Specifications; Driveshaft

Designation		Model 163
Self-locking bolt, front propeller shaft to transfer case (to rear axle)	Nm	40

Self-locking screw, propeller shaft to transfer case (to front axle)	Nm	50

Torque Specifications; Engine Mounts, Engine Supports

Designation			Engine 112.942/970 113.942/965/ in model 163.154/157/ 172/174/175
Bolt of rear engine crossmember to body		Nm	40
Bolt or nut, rear engine mount to transmission	M8	Nm	-
	M10	Nm	40

Torque Specifications; Engine Suspension, Engine Mounts, Engine Supports

Designation		Engine 612.963 in model 163.113	Engine 628.963 in model 163
Bolt/nut, rear engine crossmember to body	Nm	40	40
Bolt or nut, rear engine mount to transmission	Nm	40	40

Torque Specifications; Engine Suspension, Engine Mounts, Engine Supports

Designation		Engine 111 in model 163
Bolt of rear engine crossmember to body	Nm	40
Bolt or nut, rear engine mount to transmission	Nm	35

Torque Specifications; Transfer Case, Complete Unit

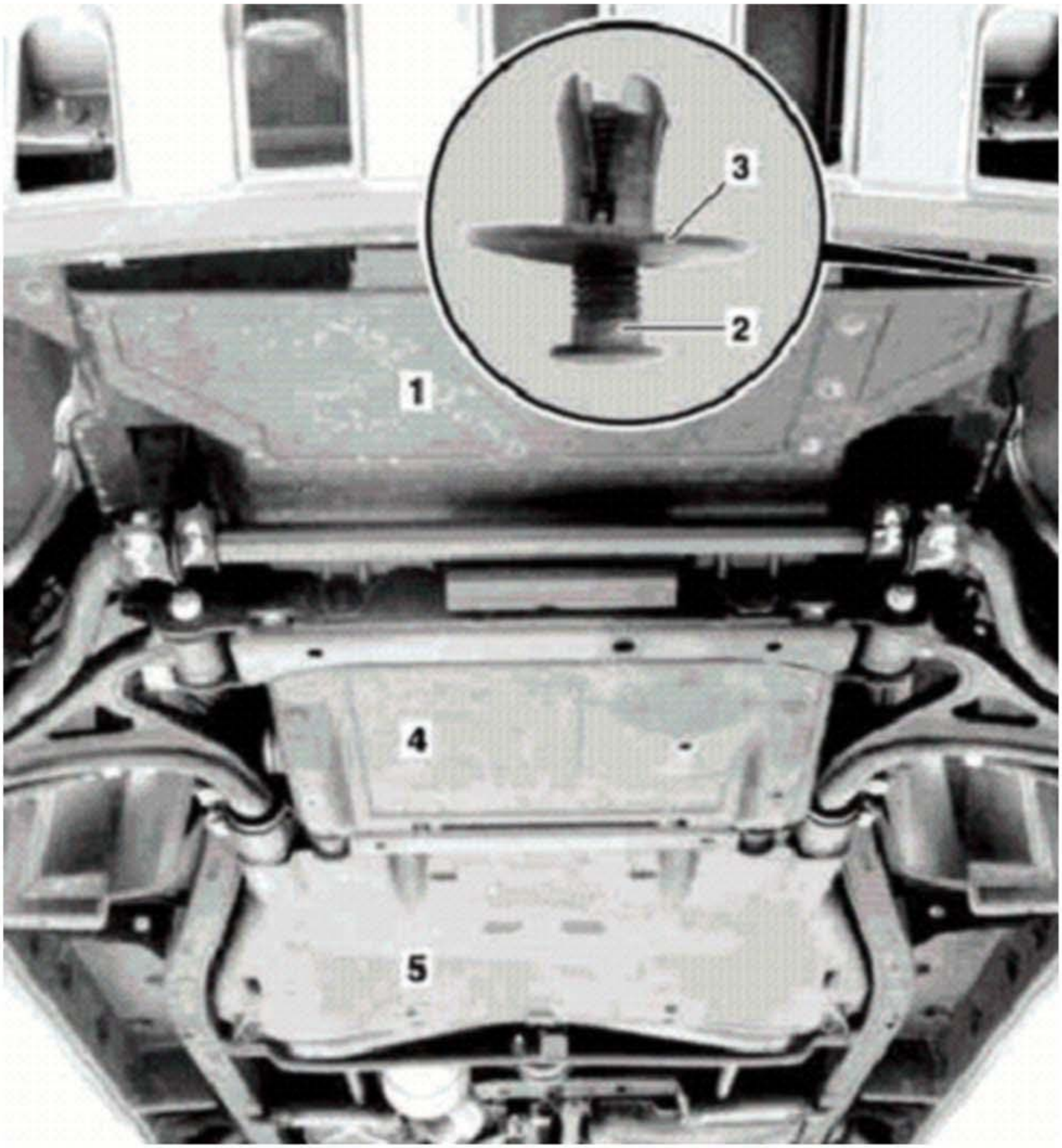
Designation		Model 163
Threaded plug in transfer case	Nm	30
Bolt, transfer case to automatic transmission	Nm	20
Bolt, transfer case to manual transmission	Nm	20

Number	Designation	Company (e.g.)	Order number
WH58.30-Z-1009-07A	Transmission plate	SLIFT Hebezeug GmbH Daimlerstrasse 9 75233 Tiefenbronn	GP MB

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Fig. 167: Commercially Available Tools (See Workshop Equipment Manual)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Remove/Install Noise Encapsulation



1 Noise encapsulation, front section

4 Noise encapsulation, center section

Fig. 168: Removing & Installing Noise Encapsulation
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

CAUTION: Inspect headless setscrews and plastic clips, replace if necessary.

1 - Remove headless setscrews (2) and plastic clips (3) from noise encapsulation front section (4). See **Fig. 168**.

NOTE: There are 6 headless set screws and plastic clips.

2 - Remove noise encapsulation front section (1).

3 - Remove headless setscrews (2) and plastic clips (3) from noise encapsulation center section (4).

NOTE: There are 4 headless set screws and plastic clips.

4 - Remove (4) noise encapsulation center section.

5 - Remove headless setscrews (2) and plastic clips (3) from noise encapsulation rear section (5).

NOTE: There are 8 headless set screws and plastic clips.

6 - Remove noise encapsulation rear section (5).

7 - Install in reverse order.

Supporting Transmission With Inspection Pit Lift

Position the lifting device under the transmission and align the adjusting spindles so that the transmission platform abuts the transmission. The transmission is to be secured to prevent it from falling down by the adjustable retaining bracket.

AUTOMATIC TRANSMISSION (AT), CONTENTS, FUNCTION DESCRIPTION

Automatic Transmission (AT), Function

Transmission Without Touch Shift 722.6 In Model 163

Automatic transmission 722.6 is an electronically controlled 5-speed transmission with a lockup clutch in the torque converter.

The ratios for the gear stages are achieved by three planetary gear sets. The 5th gear is designed with a step-up ratio as an overdrive.

Shifting is initiated electronically. The gears are shifted by the corresponding combination of three hydraulically actuated multi-disc clutches and two mechanical freewheels.

Basically automatic transmission 722.6 with electronic control offers the following advantages:

- Reduced Fuel Consumption
- Improved Shift Comfort
- More Favorable Gear Steps As A Result Of 5 Gears
- Enhanced Life And Reliability
- Reduced Servicing Costs

The electrohydraulic control unit is bolted onto the bottom of the transmission housing. The end of the transmission is formed by an oil pan made of sheet steel.

The oil pressure for the converter lockup clutch and center multiple-disc clutch is supplied via holes in the input shaft. The oil pressure to the rear multiple-disc clutch is routed through the output shaft. The lubricating oil is supplied and distributed by additional bore holes in both shafts. All bearing points of the gear sets as well as freewheels and shift elements are supplied with lubricating oil.

The parking lock gear and drive flange are connected to the output shaft by gearing.

Freewheels F1 and F2 optimize shifting. The front freewheel (F1) rests against the stator shaft extension on the transmission side and connects the sun gear of the front planetary gear set to the transmission housing in the locking direction.

The torque converter housing and transmission housing are made of a metal alloy. They are bolted together and centered via the outer multiple-disc carrier of the multiple-disc brake B1. A coated intermediate panel seals the two components.

The oil pump and outer multiple-disc carrier of the front multiple-disc brake are bolted to the converter housing.

The mechanical part consists of the propeller shaft, output shaft, a sun gear shaft and three planetary gearsets which are coupled together.

In transmissions for powerful engines, the planetary gearsets have 4 planetary gears, while for less powerful engines the front and rear planetary gear system has three planetary gear wheels. The stator shaft is pressed into this and is secured against turning by a spline.

The rear freewheel F2 connects the sun gear of the center planetary gear set to the sun gear of the rear planetary gearset in the locking direction.

The electrohydraulic control unit consists of the shift plate made of light alloy for hydraulic control and an electronic control unit.

The electrical control unit consists of a supporting body made of plastic in which the electrical components are combined. The shell is screwed to the shift plate. Conductor tracks which are integrated into the shell, connect the electric components to a plug connector. This 13-pin plug connector forms the connection with the vehicle-side wiring harness and with the ETC 5 (electronic transmission control) control module (N15/5) via a bayonet lock.

SURVEY OF SYSTEM COMPONENTS, AUTOMATIC TRANSMISSION (AT), LOCATION, TASK, DESIGN

Function Of Gear Change

See **FUNCTION OF GEAR CHANGE**.

Shifting N to D (1st Gear), Function

See **SHIFTING N TO D (1ST GEAR), FUNCTION**.

Shift From 1 to 2, Function

See **SHIFT FROM 1 TO 2, FUNCTION**.

Limp-Home Mode, function

See **LIMP-HOME MODE, FUNCTION**.

Operating Pressure, Function

See **OPERATING PRESSURE, FUNCTION**.

Lubricating Pressure, Function

See **LUBRICATING PRESSURE, FUNCTION**.

Shift Pressure, Function

See **SHIFT PRESSURE, FUNCTION**.

Modulating Pressure, Function

See **MODULATING PRESSURE, FUNCTION**.

Regulating Valve Pressure, Function

See **REGULATING VALVE PRESSURE, FUNCTION**.

Shift Valve Pressure, Function

See **SHIFT VALVE PRESSURE, FUNCTION**.

Manual Drive Mode Selection, Function

See **MANUAL DRIVE MODE SELECTION, FUNCTION**.

Oil Level Control, Function

See **OIL LEVEL CONTROL, FUNCTION**.

Function of Torque Converter Lockup Clutch Control

See **FUNCTION OF TORQUE CONVERTER LOCKUP CLUTCH CONTROL**.

Torque Converter Lockup Clutch Control Pressure, Function

See **TORQUE CONVERTER LOCKUP CLUTCH CONTROL PRESSURE, FUNCTION**.

Function Of Locking Of Selector Lever Position "P"

See **FUNCTION OF LOCKING OF SELECTOR LEVER POSITION "P"**.

Ignition Lock Locking, Function

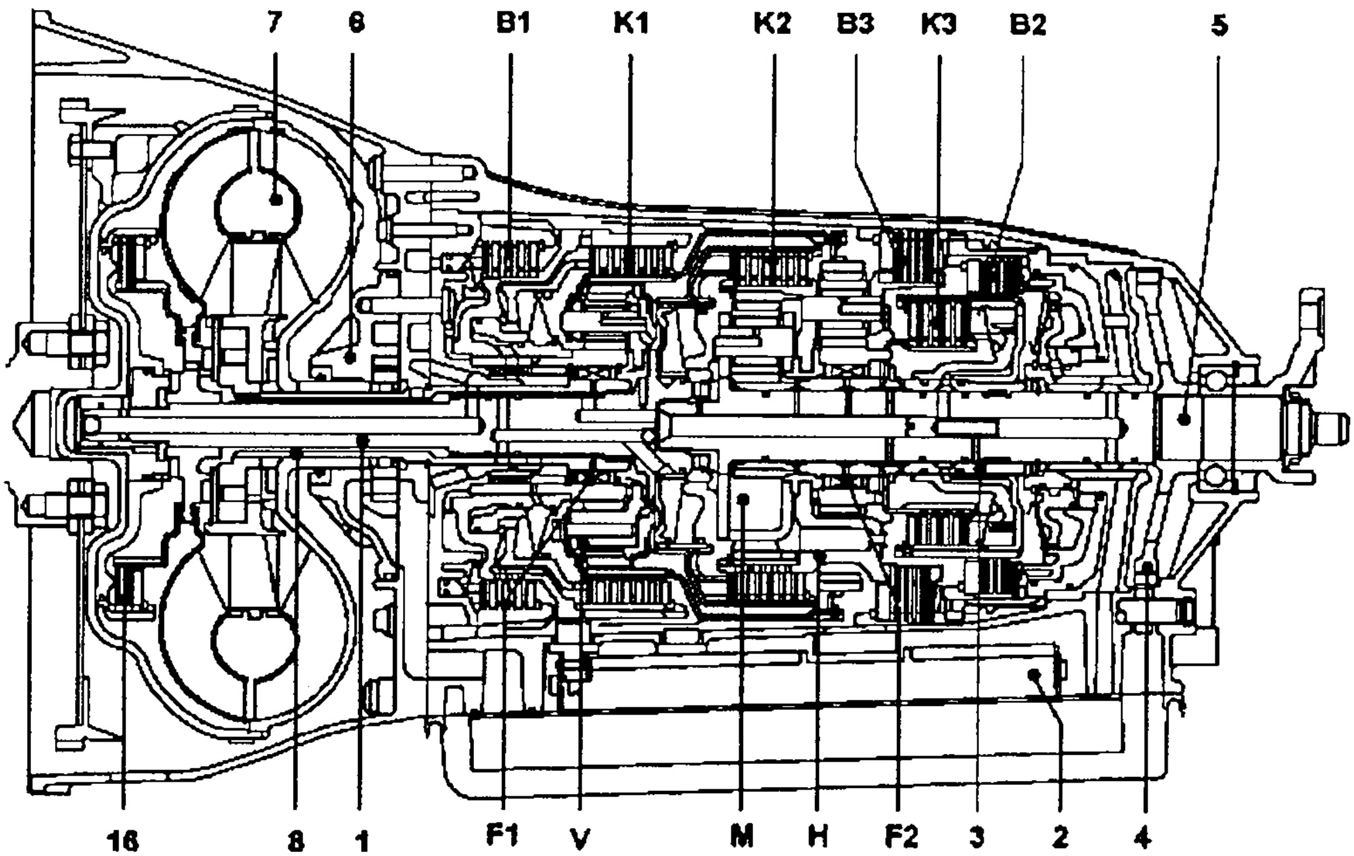
See **IGNITION LOCK INTERLOCK**.

Function Of Shift Lock Override

See **FUNCTION OF SHIFT LOCK OVERRIDE**.

Survey Of System Components, Automatic Transmission, Location/Task/Design/Function

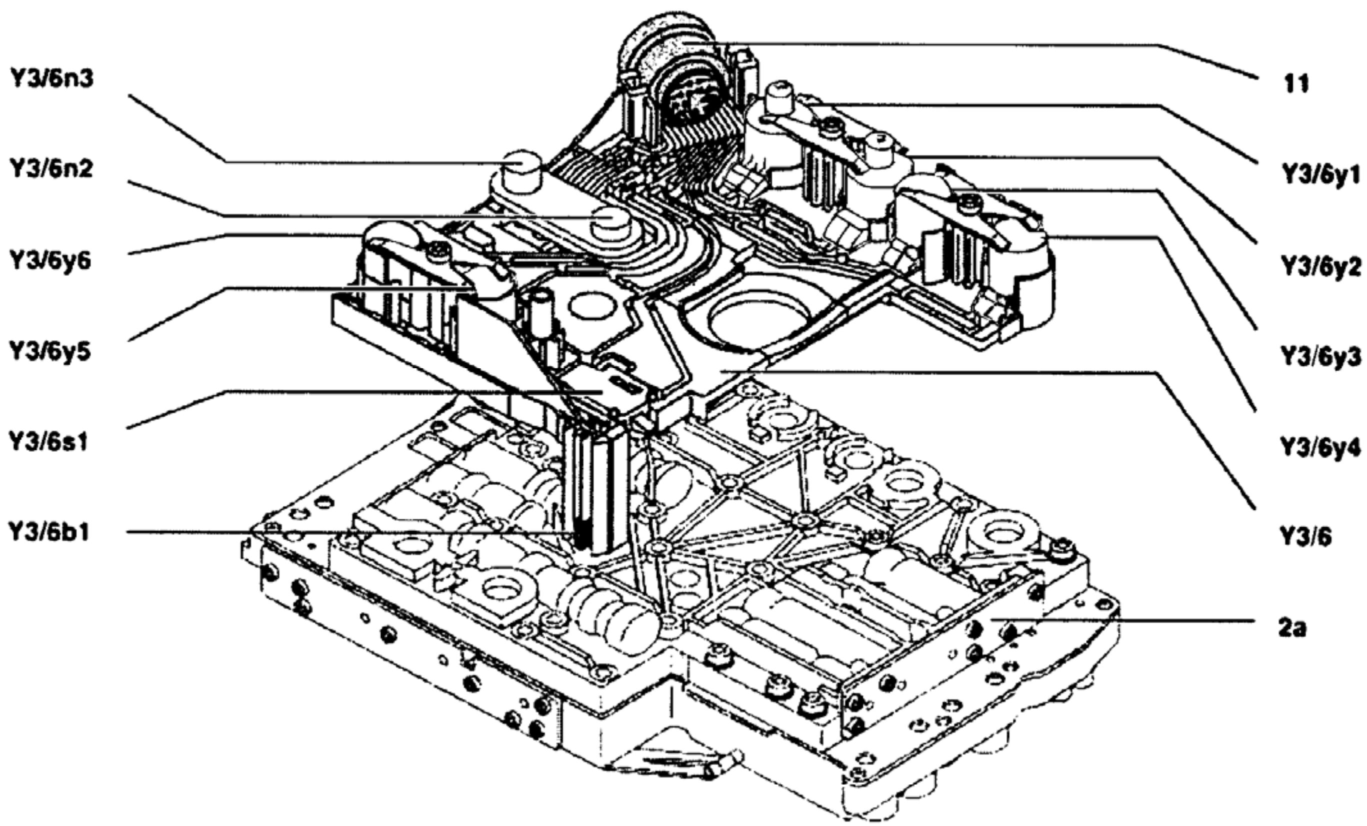
See **SURVEY OF SYSTEM COMPONENTS, AUTOMATIC TRANSMISSION, LOCATION/TASK/DESIGN/FUNCTION**.



1	Drive shaft	B2	Rear multiple-disc brake
2	Electrohydraulic control unit	B3	Center multiple-disc brake
3	Intermediate shaft	F1	Front freewheel
4	Parking lock gear	F2	Rear freewheel
5	Output shaft	H	Rear planetary gear set
6	Oil pump	K1	Front multiple-disc clutch
7	Torque converter	K2	Center multiple-disc clutch
8	Stator shaft	K3	Rear multiple-disc clutch
16	Torque converter lockup clutch	M	Middle planetary gearset
B1	Front multiple-disc brake	V	Front planetary gearset

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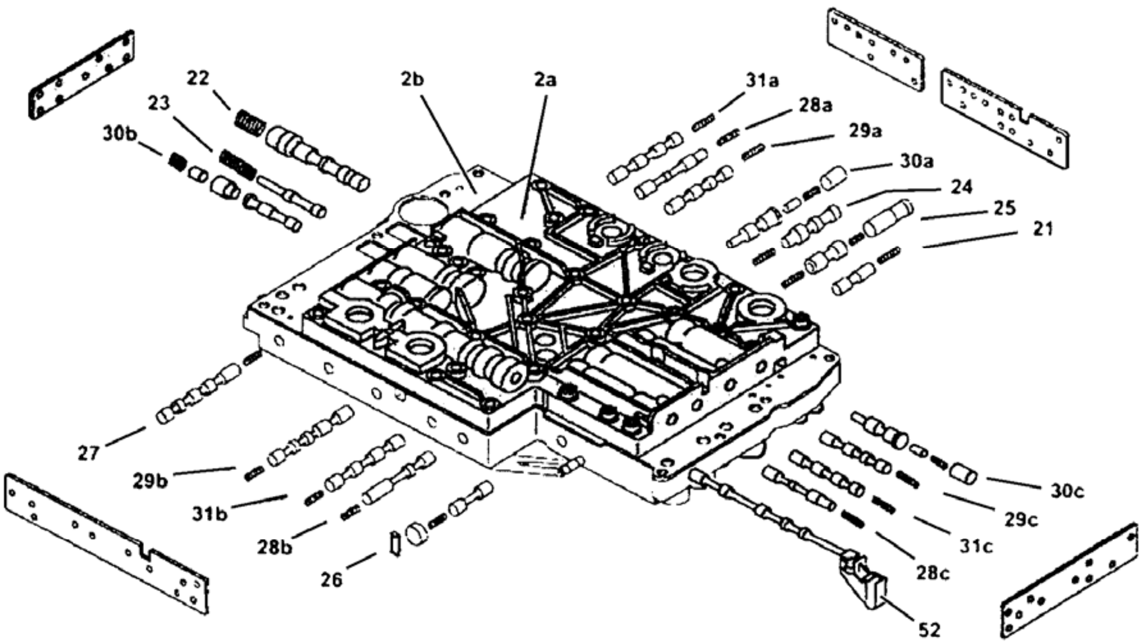
Fig. 169: Location Of Mechanical Parts
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



2a	Shift plate	Y3/6y1	Modulating pressure control solenoid valve
11	Plug socket	Y3/6y2	Shift pressure control solenoid valve
Y3/6	Electric control unit	Y3/6y3	1-2 and 4-5 shift solenoid valve
Y3/6b1	Transmission oil temperature sensor	Y3/6y4	3-4 shift solenoid valve
Y3/6n2	RPM sensor 2	Y3/6y5	2-3 shift solenoid valve
Y3/6n3	RPM sensor 3	Y3/6y6	Torque converter lockup PWM solenoid valve
Y3/6s1	Starter lockout contact		

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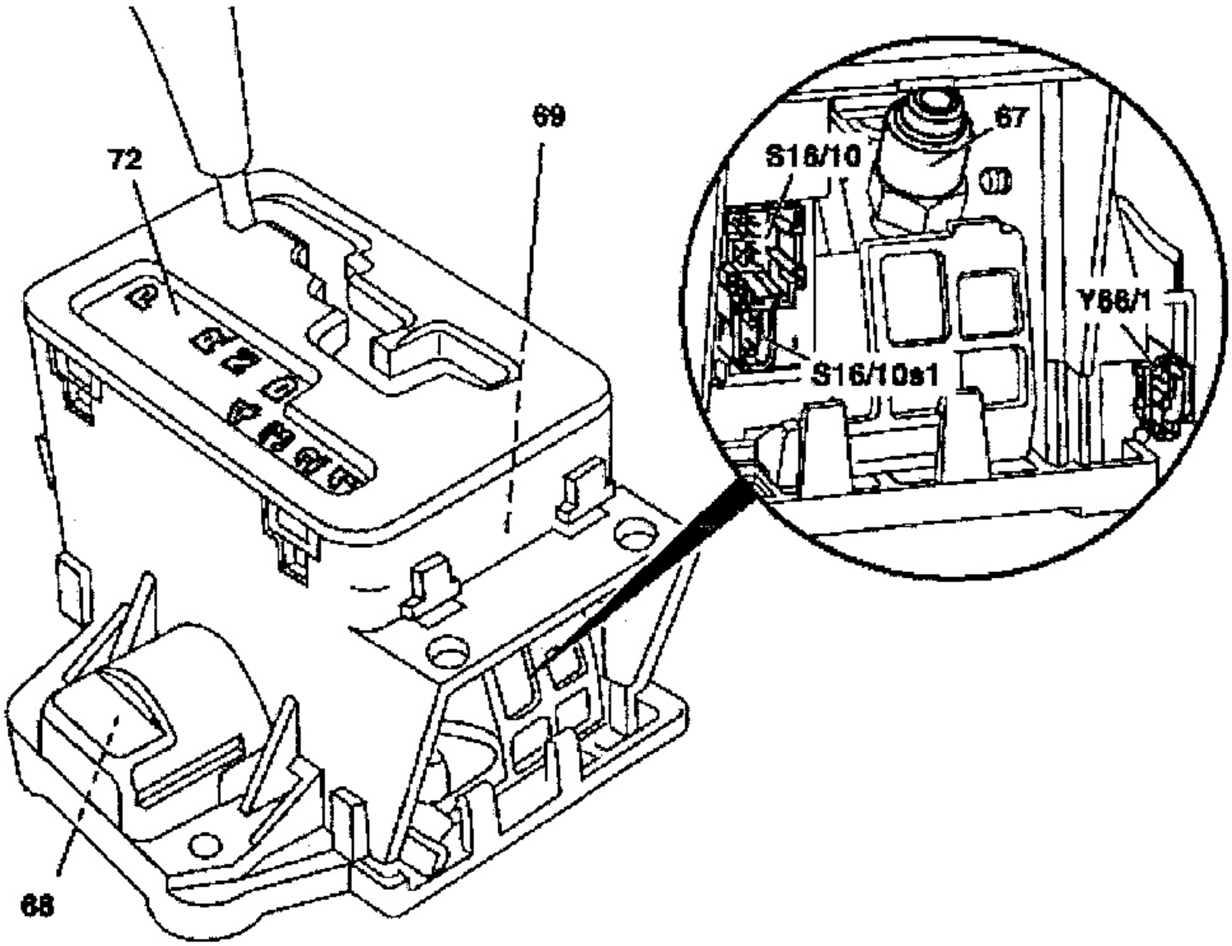
Fig. 170: Location Of Electric/Electronic Components
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



2a Valve body of shift plate
2b Valve housing of shift plate
21 Shift valve pressure regulating valve
22 Working pressure regulating valve
23 Lubrication pressure regulating valve
24 Shift pressure regulating valve
25 Regulating valve pressure regulating valve
26 Shift valve B2
27 Torque converter lockup clutch shift valve
28a 1-2/4-5 holding pressure shift valve
28b 2-3 holding pressure shift valve
28c 3-4 holding pressure shift valve
29a 1-2/4-5 shift pressure shift valve
29b 2-3 shift pressure shift valve
29c 3-4 shift pressure shift valve
30a 1-2/4-5 overlap regulating valve with sleeve and piston
30b 2-3 overlap regulating valve with sleeve and piston
30c 3-4 overlap regulating valve with sleeve and piston
31a 1-2/4-5 command valve
31b 2-3 command valve
31c 3-4 command valve
52 Selector valve

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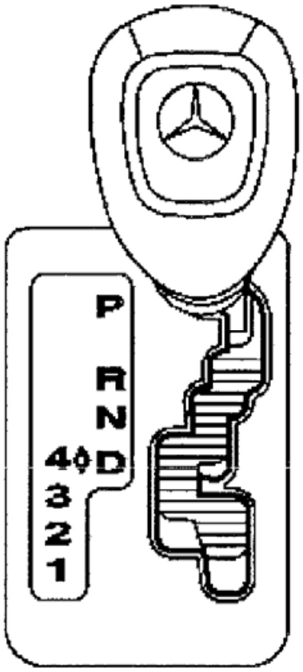
Fig. 171: Identifying Position Of Hydraulic Components
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



67	Shift detent
68	Isolating mechanism for "D-4" shift
69	R/P lock
72	Position indicator
S16/10	Transmission range recognition switch
S16/10s1	Backup lamp switch
Y66/1	Reversing and parking lock locking solenoid

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Fig. 172: Identifying Floor Shift (Without Touch Shift)
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.



The selector lever can be moved into eight different positions. Transverse shift in positions "D" and "4".

The selector lever positions have the following meanings:

P Park pawl and starting position

R Reverse gear

N Neutral and start position
(No power is transmitted. The vehicle is not in gear.)

D All five forward gears are available

4 Upshifting only up to 4th gear

3 Upshifting only up to 3rd gear

2 Upshifting only up to 2nd gear

1 Driving in 1st gear only

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Fig. 173: Identifying Selector Lever Positions
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Gear	Ratio W5A 580	Ratio W5A 330	B1	B2	B3	K1	K2	K3	F1	F2
1	3.59	3.93	□(3)	□				□(3)	□□	
2	2.19	2.41		□		□		□(3)		□
3	1.41	1.49		□		□□				
4	1.0	1.0				□□		□		
5	0.83	0.83	□(3)				□□		□	
N	-	-	□					□		
R (1)	-3.16	-3.10	□(3)		□			□□		
R (2)	-1.93	-1.90			□□			□		

(1) Program "S"

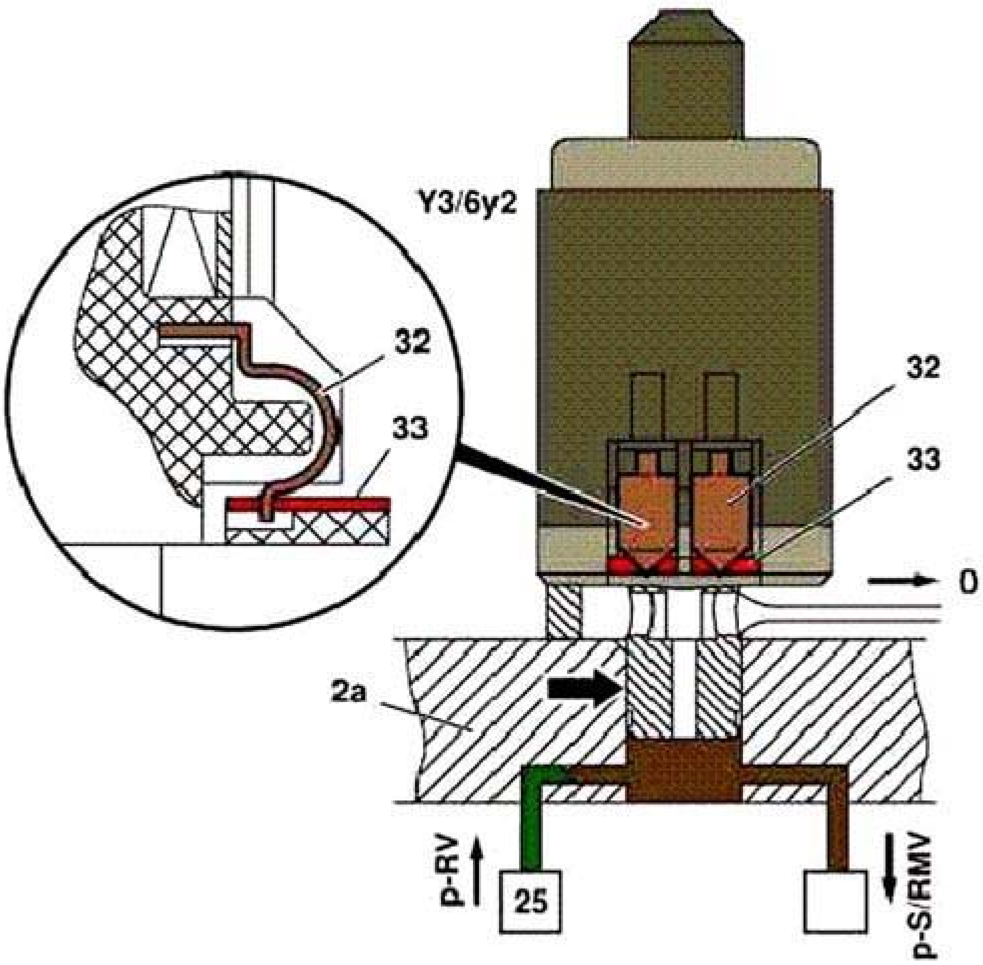
(2) Program "W" or "C" (depending on period of manufacture)

(3) Shift elements are only necessary during deceleration

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Fig. 174: Identifying Gear Ratios
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Pressure Regulating Solenoid Valve, Design



0	Oil sump drain
2a	Valve housing of shift plate
25	Regulating valve pressure regulating valve
32	Contact spring
33	Conductor track
p-RV	Regulating valve pressure
p-S/RMV	Shift pressure control solenoid valve
Y3/6y2	Shift pressure control solenoid valve
Arrow	Seal

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Fig. 175: Shift Pressure Regulating Solenoid Valve, Design

Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Structure

The shift pressure regulating solenoid valve (Y3/6y2) has an interference fit and is sealed off to the valve body of the shift plate (2a) by a seal (arrow). See **Fig. 175**.

The contact springs (32) on the shift pressure solenoid valve (Y3/6y2) engage in a slot in the conductor tracks (33). The force of the contact spring (32) ensures safe contacts.

Shift Pressure Regulating Valve, Location/Task/Function, Also Float, Location/Function

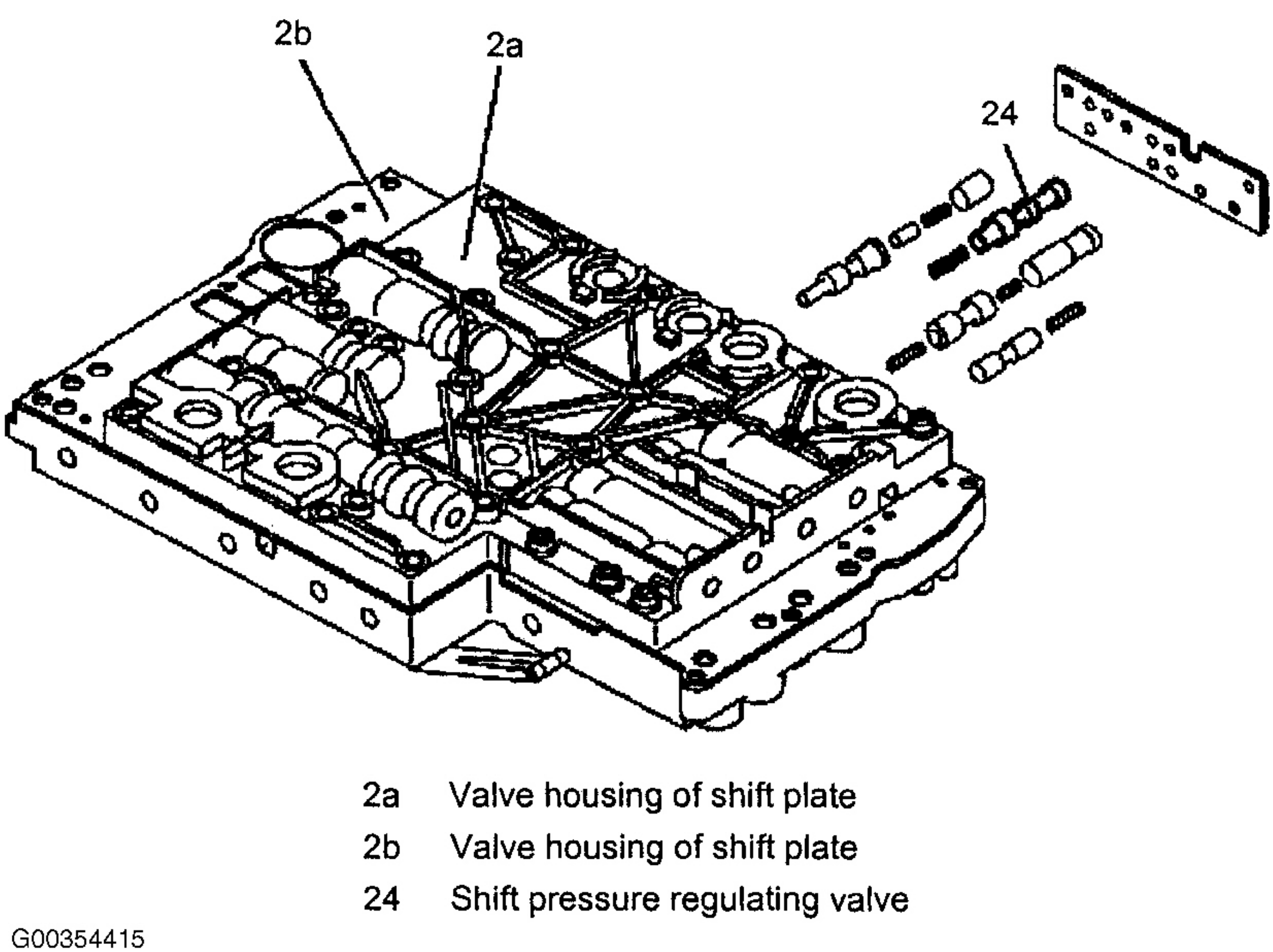


Fig. 176: Shift Pressure Regulating Valve, Location/Task/Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Shift Pressure Regulating Valve, Location

In the valve housing of shift plate (2b). See **Fig. 176**.

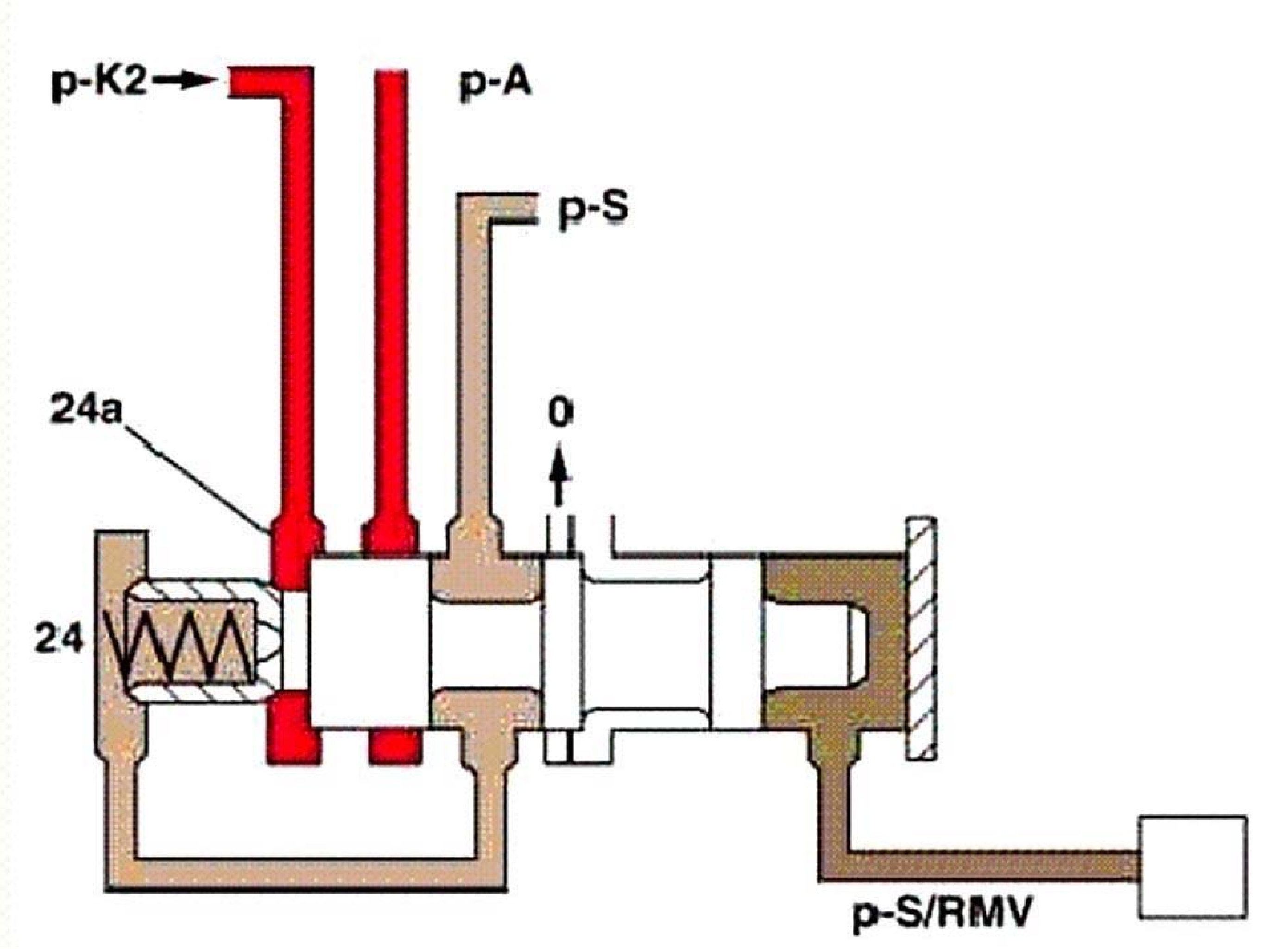
Shift Pressure Regulating Valve, Task

Control of shift pressure.

Shift Pressure Regulating Valve, Function

See **SHIFT PRESSURE REGULATING VALVE, FUNCTION**.

Shift Pressure Regulating Valve, Function



0	Oil sump drain
24	Shift pressure regulating valve
24a	Annular surface
p-A	Working pressure
p-K2	Pressure applied to the rear multiple-disc clutch
p-S	Shift pressure
p-S/RMV	Shift pressure control solenoid valve

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Fig. 177: Shift Pressure Regulating Valve, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The shift pressure (p-S) is determines by the shift pressure regulating solenoid valve (Y3/6y2) and the shift pressure regulating valve (24). See **Fig. 177**. In addition, pressure from the multiple-disc clutch K2 (p-K2) is also present at the annular surface (24a) of the shift pressure regulating valve (24). This reduces the shift pressure in 2nd gear.

Position Display, Location Task

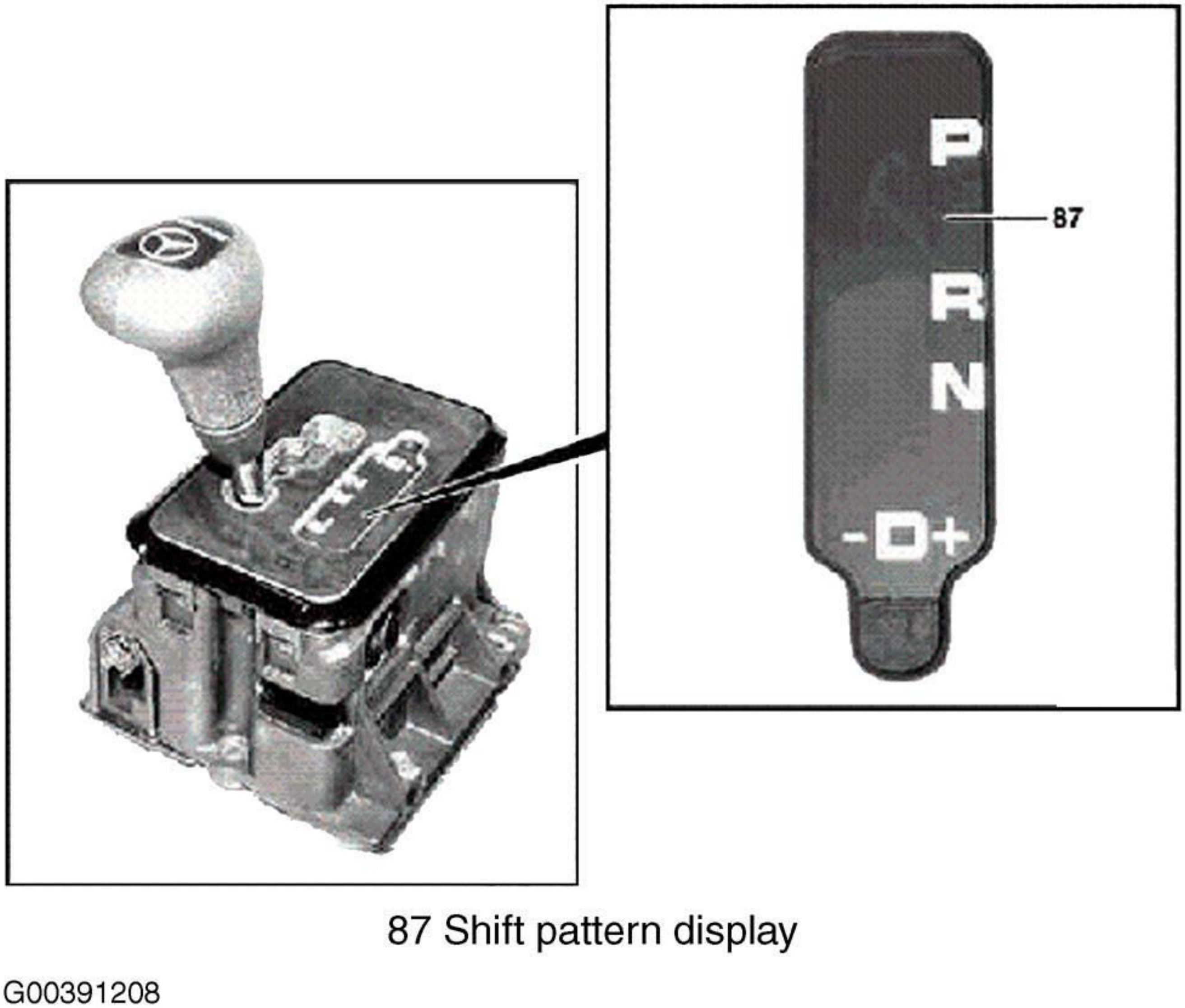


Fig. 178: Position Display
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Position Display, Location

The position display (selector scheme symbols (87) is accommodated in the floor shift cover. In addition a gear display is located in the instrument cluster (A1). See **Fig. 178**.

Position Display, Task

Via the selector scheme symbols (87) the alternative selector lever positions and their sequence are shown symbolically.

Speed Sensor, Function

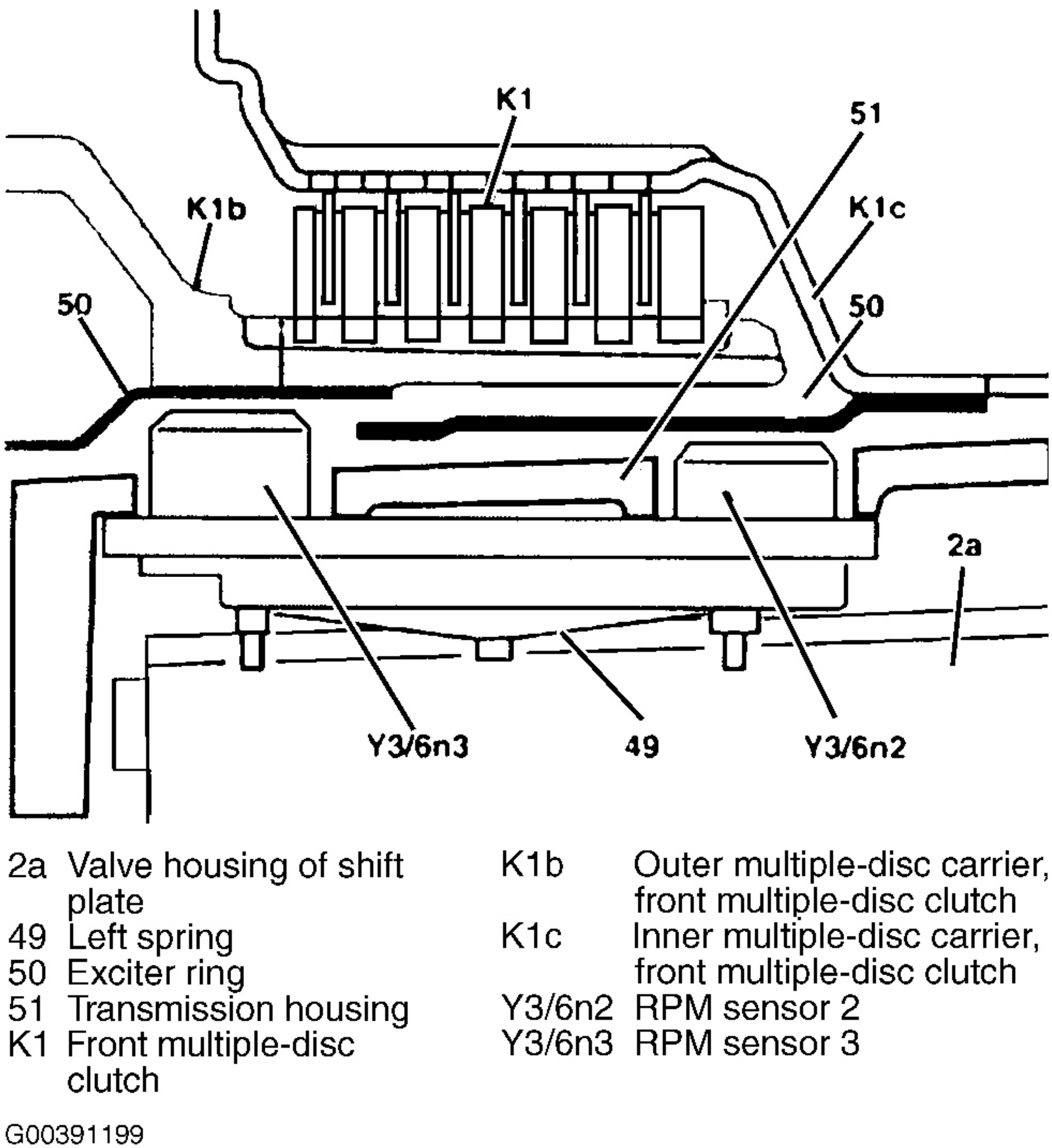


Fig. 179: Speed Sensor, Function
Courtesy of MERCEDES-BENZ OF NORTH AMERICA.

Operation

The RPM sensors are pressed against the transmission housing (51) by a spring (49) which is held against the valve housing of the shift plate (2a). See .**Fig. 179** This ensures a defined distance between the RPM sensors and the exciter ring (50). RPM sensor 2 (Y3/6yn2) records the speed of the front planetary gear carrier via the inner multiple-disc carrier of the front multiple-disc clutch (K1c).